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THE IRON AGE

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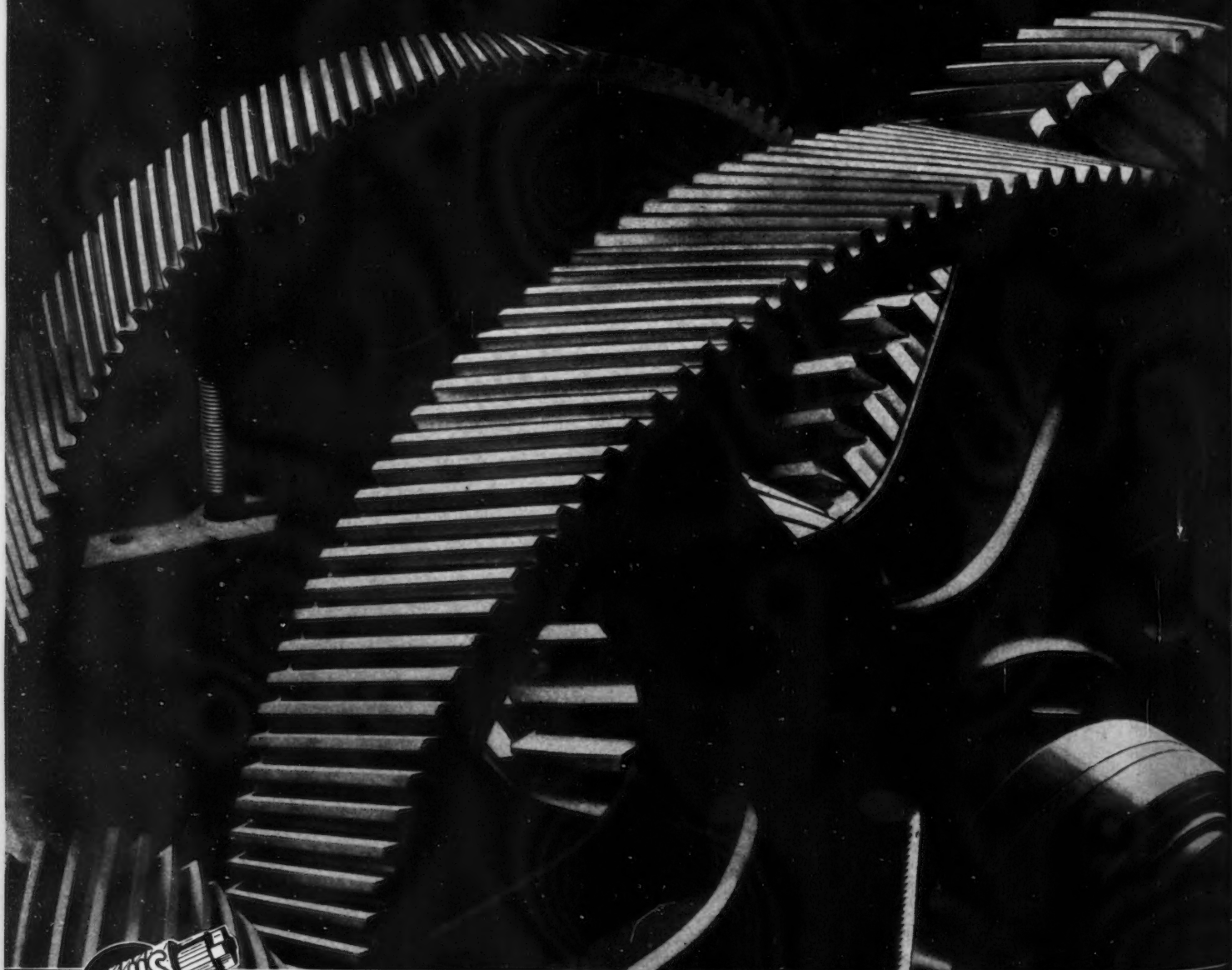
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▲▲▲ THE IRON AGE ▲▲▲

APRIL 20, 1939

ESTABLISHED 1855

Vol. 143, No. 16

"I'm Asking You"

BUSINESS and industry, collectively including all forms of private enterprise, are the most valuable of America's possessions.

Public service in all of its forms is financed by private enterprise. In addition, it furnishes the money for all wages, salaries and dividends. Without it there would be no doctors' bills paid and no rent money ready on the first of the month.

Private enterprise provides us with at least nine-tenths of the necessities of life, measured in goods and services, and with virtually all of our luxuries.

Sometimes you will hear it said that private enterprise should take over the support of WPA workers and others and give them jobs. Private enterprise is paying the wages of the millions who comprise the WPA and other such services. Who did *you* think was putting up the money for it? Surely not Uncle Sam. If Uncle Sam did not have private enterprise to turn to for funds, he couldn't scare up a dime for a cup of coffee.

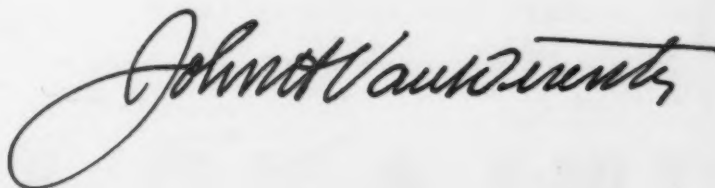
Now, this being true, wouldn't you think that every man, woman and child in this country would try to see that the road was kept clear and open for private enterprise? And wouldn't you think that our representatives in Congress and state legislatures would make it "point number one" to keep obstructions from that road?

You have heard statesmen speak for labor, heard them defend the rights of women and children. You have heard them orate and seen them legislate in defense and protection of everything under the sun—except one thing—the profit margin of private enterprise.

Why is it that we condone failure and condemn success? Why is success in business, which is so vital to the continuance of private enterprise, the recipient of so many dead cats and brickbats?

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BIS. ?

GRAY IRONS

VS.

Gray Iron

By V. H. SCHNEE

*Research Engineer, Battelle
Memorial Institute*

THE Gray Iron Founders' Society in an effort to promote better understanding of the mutual problems of the producers and purchasers of gray iron castings has recently completed for its members a compilation of the engineering properties of gray cast irons as given in the technical literature. The critical bib-

liography on which this compilation is based was assembled at Battelle Memorial Institute. So much of this information is of interest to the engineer as well as to the foundryman that the Gray Iron Founders' Society has given permission for the publication of part of this work.

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GRAY cast iron is one of the best known and least understood of the common materials of construction. One reason for this is that "cast iron," like "steel," is a general term used to designate not one, but a class of materials. These include the soft, weak irons sometimes used for sash weights, the hard and brittle materials formerly used for stove plates, the machinery irons and at the other extreme the irons used for cast crankshafts and the like, having the strength of steel along with considerable toughness and ductility.

In the case of steel, engineers are familiar with the fact that different compositions and heat treatments give

different combinations of strength, toughness, and allied properties. Usually, unless the cost can be considerably increased, a gain in one property is offset by a loss in some other, and in every cast the engineer's selection is a compromise. Similarly, in gray iron, changes in composition and foundry practice result in a gain in some properties and a loss in others, costs remaining the same. But for every engineering use there is, somewhere along the line, a most suitable and economical grade of cast iron. Making the necessary compromise is the joint responsibility of the purchaser, who knows what properties are most important in his particular service, and

of the foundryman, who knows what adjustments can be made in composition and melting and finishing practice to strengthen those properties of the iron. If the user who needs the utmost in a combination of properties, say that of compressive strength and damping ability, or torsional strength and notched endurance, or high modulus and machineability, or low modulus for tight press fits, and high tensile strength, or some other special combination, will explore the possibilities of attaining a good compromise rather than a poor one, he might effect surprising and welcome economies. The road to this, of course, is a study of the properties of different gray irons as shown by specific tests which appraise the desired properties.

In order to illustrate the inter-relation of the various engineering properties of gray cast irons a comparison of two grades of cast iron has been prepared. One of these grades represents the soft, common gray iron, containing about $3\frac{1}{2}$ per cent carbon and $2\frac{1}{4}$ per cent silicon, that has been available and in engineering use since the earliest days of the industry. Irons of this type are now included in Class 20 of the American Society for Test-

ing Materials specifications. The other, represents a medium high test gray iron, Class 40, say of about 3 per cent carbon and 2 per cent silicon (or equivalent variations in carbon:silicon ratio), of the type that has only relatively recently become commercially available. This comparison will indicate what other features are, on the average, gained or sacrificed by doubling the tensile strength in castings of medium section, i.e., using specimens from test bars 1.2 in. in diameter to represent castings, the ruling section of which is from $\frac{3}{4}$ to 1 in. thick.

The specifications of the A.S.T.M. currently mention seven grades of cast iron, based on tensile strength, ranging from Class 20 with a tensile strength of 20,000 lb. per sq. in., through Classes 25, 30, 35, 40 and 50 to Class 60, with a tensile strength of 60,000 lb. per sq. in. The most cursory appraisal of the metallurgy of gray irons will show that, with the variety of alloying elements and the marked effect of melting practice and ladle additions, it would be most unlikely that all properties of any two gray irons are alike, merely because they have the same tensile strength. The other properties may and do deviate. Hence the A.S.T.M. classes serve primarily as nomenclature by which various individual irons may be conveniently grouped into classes which may then be considered according to the engineering problems involved, either on the basis of the average of the other properties in ordinary commercial irons, or on the basis of the deviation from such an average. Such approaches to these averages as can be computed on the basis of the available data, form a useful baseline for consideration of the deviations.

Emphatic warning may properly be given to the engineer that such averages are not sufficient for careful design. The iron actually used may or may not meet the average. Moreover, if the designer forgets that irons can be found that exceed the average in respect to some important property which he especially needs to utilize, he neglects potentialities for a really close fitting to his requirements.

Yield Strength in Tension

Engineers are accustomed to designing in steel on the basis of yield strength, which, in commercial engineering steels, may range from as low as 40 per cent to the common value of

50 per cent and, less commonly, to as high as 80 per cent of the tensile strength. Steel thus has a long plastic range between the yielding and the ultimate fracture. Cast iron does not have an analogous range of yielding. Its stress-strain diagram is smooth all the way up instead of showing a jog. This connotes a lack of that malleability and cold formability possessed by steel, but conversely means that cast iron may be loaded to a greater percentage of its tensile strength without necking down and failing, than is the case with most steels. While the actual factor of safety in design will vary with the particular structure, it is considered that gray iron will actually support without failure a static load of at least 80 per cent of its tensile strength.

This does not mean that no plastic deformation at all occurs in such loading, for the stress strain diagram, accurately determined, shows a minute curvature, almost from the origin. However, once this minute deformation has occurred, as when the piece is loaded and then unloaded a few times, the stress-strain diagram is straightened out, up to the particular stress that has been applied.

On the basis of load carrying ability in tension, as related to the stress-

strain diagrams, the Class 40 iron thus has twice the strength of the Class 20.

Modulus of Elasticity in Tension

The common gray iron, Class 20, has an elasticity modulus of about 12,000,000 lb. per sq. in.; and the high test Class 40 iron has a modulus of 17,000,000 lb. per sq. in. The higher the modulus, the less a given force will deflect a specimen of given size and shape. The ratio of force to deflection changes slightly in gray irons as the force increases, so the apparent modulus is determined at one-fourth of the tensile strength. The modulus of the common iron is low, comparable to that of aluminum, copper, bronze, etc., while that of the high test iron is higher, and as the tensile strength increases, the modulus climbs still closer to that of steel. For example, the deflection of gray iron frames and housings of the same dimensions will be the less, the higher the strength and modulus of the iron. If ability for maximum elastic deflection were desired, as in making some press fits, the lower modulus grades would have the advantage. Very high test iron approaches the stiffness of steel.

Because the stress strain diagram is not straight, the value of the modulus is only an approximation. However,

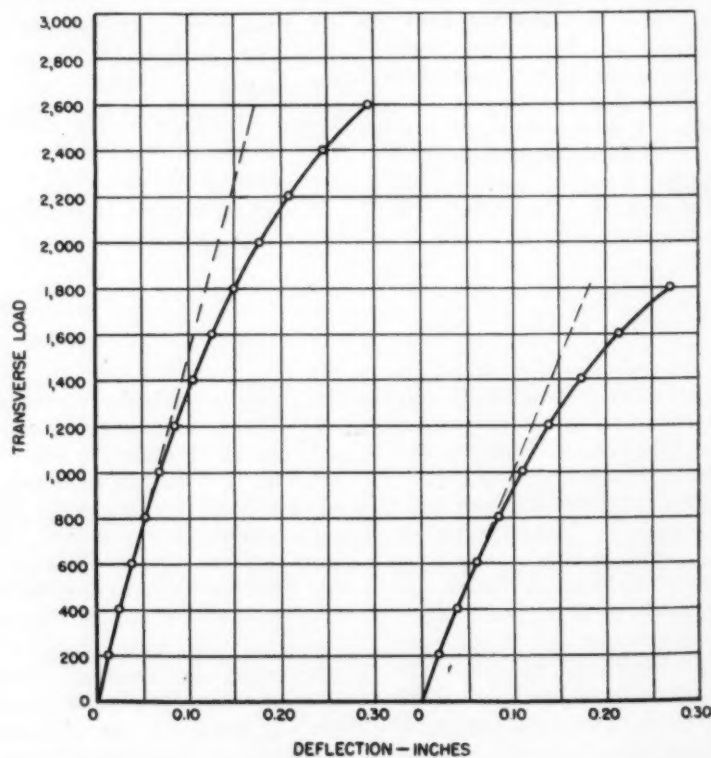


FIG. 1—Transverse strength-deflection curves for Class 20 (right) and Class 40 (left) cast irons, showing modulus of elasticity determined at one-fourth load.

taken in each case at one-fourth the breaking load, the stiffness of cast iron may be evaluated by the apparent modulus in tension, compression or bending. It is most easily measured in the transverse test. While the general trend is materially upward with strength, it is indicated that when iron castings are to be used for stiffness on the one hand or for ease of press fitting on the other, the stress-strain



FIG. 2—Typical microstructure of Class 20 (left) and Class 40 (right) cast irons, illustrating the influence of quantity and distribution of graphite flakes upon the mechanical properties. At 100 diameters.

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curve for the iron to be used should be determined, for the ordinary strength tests will not pick out differences in stiffness. Typical stress-strain diagrams are shown in Fig. 1.

Brinell Hardness

The Class 20 iron has a hardness of from 120 to 160 Brinell, and the high test Class 40 iron has a hardness of from 200 to 240. The Brinell hardness does not increase in exact proportion to the tensile strength. Hardness is not so accurate a guide to most of the properties of gray iron as is the case with steel. Because of the graphite in the structure of gray iron, the Brinell test with its larger impression gives more uniform and dependable results than methods using small indenters.

Compressive Strength

The compressive strength of Class 20 iron is 80,000 lb. per sq. in., whereas Class 40 has a strength of about 130,000 lb. per sq. in. Instead of being about the same as the tensile

strength, as is the case with steel, the compressive strength of gray iron is three to four times the tensile strength. This high strength in compression is one reason for the wide use of gray iron in compression members. Compressive strength follows Brinell hardness more closely than do the other properties.

Transverse Strength

The transverse breaking load (1.2 in. diameter bar, 18 in. span) for Class 20 iron is 1600 to 1800 lb., and for Class 40 iron is 2600 to 2800 lb. Beside evaluating strength in beam loading, the transverse test is the primary strength test in practical testing because it is so easily made. For a definite span, the load figure, corrected for any deviation from the standard diameter test bar, may be used directly as a measure of strength for all irons tested with the same diameter test bar and that span. If comparisons are to be made with bars of other diameters or other shapes, or with other spans a calculation of the modulus of rupture is made. Because gray iron has some

plasticity and is not completely elastic, the mathematics of this calculation are not exact.

Modulus of Rupture

The calculated modulus of rupture for the Class 20 iron is 50,000 lb. per sq. in., and for the Class 40 iron the modulus is about 75,000 lb. per sq. in. In the early days of standardization the bars were broken on a shorter span than that now specified, and those early data can be compared with modern data only by calculating both over to the modulus of rupture. A few firms that have amassed data on the old span continue to use it, so caution is needed to make sure that the user and the foundryman are both referring to the same conditions of transverse testing.

Toughness

Gray iron has unusual properties among structural materials; for even under low loads it shows traces of definite plasticity, i.e., the stress-strain curve is slightly curved and becomes straight only after the iron has been

cold worked in the course of being slightly deformed. Yet, on the basis of elongation in the tensile test, in bend tests or single blow notched bar impact tests, such as are used to evaluate toughness in other materials, gray iron shows a brittle behavior. Gray irons of different classes, however, differ in toughness to an extent that should be recognized in engineering design. These differences are measured by the amount a transverse bar will bend before it breaks, this deformation being partly plastic and partly elastic. The actual deflections, of course, depend on the diameter and span of the test bar and may only be directly compared for the same diameters and spans. Another means of appraisal is the plasticity or set at 80 per cent of the transverse breaking load after applying in turn increments of 20, 40, 60 and 80 per cent, and releasing the load, so as to allow measurement of permanent set. Still another is by the total work required to break the transverse bar, termed the "transverse resilience" or "energy of rupture" which is obtained by noting the area under the stress-strain curve. This figure affords a very valuable comparison, though it calls for a series of observations during the transverse test, which slows up testing. An approximation is sometimes made by taking one-half the product of transverse strength in pounds and deflection in inches. This value is termed "triangular resilience." It is a moderately useful but not very accurate method of comparison, having limitations similar to those of the various "merit indices" for steels.

On these bases, the toughness of the Class 20 and the Class 40 irons may be compared as follows: Deflection of 1.2-in. bar on an 18-in. span of approximately 0.20 in. and of 0.30 in. respectively; permanent set of 0.05 in. and of 0.05 to 0.10 respectively; and transverse resilience of 200 to 400 in.-lb. and of 400 to 600 in.-lb. for the Class 20 and the Class 40 irons respectively. Thus, in general, the higher test irons within this range have improved toughness along with their higher strengths.

Impact

As stated above, small notched bar impact tests give low values in foot-pounds and such tests do not clearly differentiate among irons. Single blow Charpy type impact tests on unnotched, full size 1.2-in. diameter bars, 18-in. span, give a value of 40 ft.-lb. for Class 20 irons, and 70 ft.-lb. for Class

40 irons. Impact tests of this type usually correlate fairly well with the transverse resilience of the individual irons being tested.

Impact Drop Tests

A repeated (incremental) impact drop test, as, for example, dropping of a 25-lb. hammer, first from a height of 1 in., with each successive blow from an added 1-in. height, on a 1.2-in. diameter bar, supported on a 6-in. span, is sometimes used. Many variations in specimen dimensions, weight of trip and height of fall, have been used in experimental repeated impact tests. There has been little approach to standardization. This test shows something about the ability of the iron to stand up after previously having been stressed severely. Fracture after 10 to 15 height increments is typical for the Class 20 iron, and fracture after 15 to 25 height increments is typical of Class 40 iron.

Endurance Limit

For smooth specimens in repeated, reversed bending, half stress range, the endurance limit of Class 20 gray iron is about 10,000 lb. per sq. in., and that for the high test Class 40 iron is 20,000 lb. per sq. in. The endurance limit, or ability to resist repeated stresses without fracture, increases with the tensile strength and is about half the tensile strength, just as is the case with steel.

Notch Sensitivity

(On specimens with a sharp, square notch, half stress range)

The notch sensitivity, i.e., notched endurance limit, on specimens with a sharp, square notch, half stress range, is 10,000 lb. per sq. in. for Class 20 iron, and 18,000 lb. per sq. in. for Class 40 iron. Here is an outstanding difference between gray irons and steels. In this test the irons are scarcely injured by the notch, while soft steels have their endurance limits halved by the notch, and in hard steels, the harmful effect of the notch is still greater. Though a very high test iron whose matrix is more steel-like, is slightly notch sensitive, the benefits of increased strength are well retained even in the presence of notches, keyways, poor fillets and the like, that would be ruinous to a design in steel. Sharp notches are not good engineering even with cast iron, but when they cannot be avoided, the gray irons will stand them much better than

steels or most non-ferrous alloys. This advantage is largely retained even in the very high test gray irons, as it is related to the presence of the graphite flakes and is not lost even when the flakes are very small.

As has been shown by tests to failure of cast crankshafts, the effective strength of a cast iron part can be decidedly increased by design which avoids notches and sharp changes of section, so that this comment on the lesser notch sensitivity of gray iron is not to be interpreted as an invitation to poor design, but merely to point out that the penalty for poor design is not quite so large as with more notch sensitive materials.

Damping Capacity

The Class 20 common gray iron has an extraordinarily high damping capacity, whereas Class 40 has only a high damping capacity. The damping effect in gray iron, like the lack of notch sensitivity is related to the presence of graphite. Damping ability is decreased considerably in the very high-test alloy irons, but is still high in the Class 40 irons. The damping property is valuable in machine bases and the like where transmitted vibration, or noise, is to be avoided. The soft, common gray iron has superior damping properties.

Shear Strength

Class 20 common iron has a shear strength of from 23,000 to 30,000 lb. per sq. in. Class 40 has a shear strength ranging from 45,000 to 50,000 lb. per sq. in. Doubling the tensile does not double the shear strength. The reliability and precision of this test are often questioned, but recent investigations indicate that the shear strength is proportional to the tensile strength, being from 1.1 to 1.33 times as great. In France, this test has been adopted as standard, using tiny specimens cut from the actual casting.

Torsional Strength

The torsional strength of the Class 20 iron is judged as being about 20,000 lb. per sq. in., and that for Class 40 iron is about 40,000 lb. per sq. in. Relatively little information is available on these classes of gray iron in torsion. Alloyed irons of still higher strength than Class 50 are used for cast crankshafts and the like. In these irons the torsional strength equals or exceeds the tensile strength. On the whole, the torsional properties may be

considered as rising with the tensile strength, but not necessarily in exact proportion to it.

Effect of Temperature

At elevated temperatures, the mechanical properties of gray irons are but slightly affected and, as long as "growth" does not come into play, the properties are not appreciably altered up to around 750 deg. F. or higher, although some specifications limit the use of gray iron to 450 deg. F. At subnormal temperatures the properties do not change materially save that toughness in impact is somewhat decreased, as is the case with most alloys. That is, as far as the matter has been examined, gray iron is not notably temperature sensitive, and comparisons between the Class 20 and the Class 40 irons should remain much the same over a wide range of temperatures as they appear in room temperature tests.

Growth

Under repeated heating to, and cooling from, a high temperature, cast iron objects, such as grate bars, may expand permanently or warp severely. Ordinarily, growth is not met below 600 deg. F., and often not below 1000 deg. F. A factor is the formation of oxidation products in the pores of "open" irons. As these products build up they tend to wedge the iron apart from many internal points, producing permanent expansion and weakness. For complete growth resistance, alloying to produce very stable carbides is practiced. However, as between the soft, open, Class 20 irons and the more dense, finer grained, lower carbon, high test Class 40 irons, the latter is definitely superior in resistance to growth.

Welding

Because of the low ductility of gray iron, a welded joint cannot yield under contraction stresses as well as a more ductile metal. There is also the difficulty of avoiding the formation of chilled iron when a cast iron filler rod is used. Nevertheless repair of gray iron castings and assembly of gray iron parts to wrought steel parts by welding, are successfully practiced. Use of bronze, steel or monel filler rods provides a ductile joint, though such rods are not always necessary. Flash welding is successfully practiced. There has been little discussion of the weldability of high test versus common iron, but it has been pointed out

that large graphite flakes do not provide a good foundation for the weld, so that welding is easier in irons with small graphite flakes. Thus high test irons should have some advantage in weldability over common iron.

Machineability

The desirable property that is most notably decreased as the strength rises is machineability. It is difficult to put machineability into numerical terms. One rough appraisal is in terms of permissible speed in lathe turning, taking ordinary cuts. Thus, it might be calculated that, with high speed tools, Class 20 can be turned up to 180 ft. per min.; Class 40 can be turned up to 75 to 100 ft. per min.; Class 50 can be turned up to 50 to 75 ft. per min., and Class 60 can be turned up to 20 ft. per min.

Broadly speaking, machineability drops as tensile strength and hardness rise, but for equal strength or equal hardness there may be marked variations in machineability. Moreover, two irons equally machineable in turning may not be so in other types of machining operations. A compensating effect, when surface finish and smoothness are sought, is that the finer graphite flakes in the higher strength irons allow production of a more nearly mirror finish.

Carbide cutting tools have been developed so that there are now grades available for any type of gray iron. In general, it is accepted that carbide tools can be operated at three times the speed of high speed tools. By the use of the proper grade of carbide tool, correctly ground and used in rigid machine tools even the Class 60 irons are economically machined. When a machine shop is properly tooled-up to handle the high test irons, machineability ceases to be an important factor, since productivity per machine and man hour may be held at a higher point than with the softest cast iron in the average machine shop of a decade ago.

Wear Resistance

As would be expected, since machining and wear are both processes for the removal of metal, the more readily an iron is machined, the poorer its wear resistance. Broadly speaking, wear resistance tends to increase as strength and hardness increases, especially in the range between Class 20 and Class 40 irons, but decided variations occur, depending on the type of wear encountered.

Any wear problem has to be considered as an individual case and studied as such. Generalizations as to wear resistance and comparisons made on the readily measured properties of irons without considering the exact conditions of service, may lead to serious error.

Corrosion Resistance

The general problem of corrosion resistance of cast iron is too complex for discussion here. In almost every corrosive service a dense strong iron is less readily attacked around the small graphite flakes than is a soft, open iron, about its coarser graphite flakes. Hence the structure of Class 40 iron indicates that it should, in general, be slightly superior to Class 20 in equivalent corrosive service.

Size Sensitivity

The foregoing comparisons have been made on the basis of a single section, the so-called "medium section" represented by a 1.2 in. diameter test bar, which is considered to show the properties of castings from $\frac{3}{4}$ to 1 in. thick. The adjustment in composition made to produce the different grades for the irons compared in the previous discussion would be such, chiefly in carbon and silicon, as would give those tensiles while avoiding chill in the 1.2 in. diameter test bar or in comparable castings.

But not all castings are from $\frac{3}{4}$ to 1 in. thick, nor are all castings of that ruling thickness free from lighter or heavier sections, in spite of the fact that it is a sound principle of design to make a casting of such section in all parts that no one part will solidify very much faster or slower than any other part. It is necessary to consider the cases where the ruling section of the casting is very light or very heavy, and that where both light and heavy sections are encountered.

It is well known that soft irons in large section tend to have weak, open, corky centers and that the same is true of heavy sections of complex castings with some thin sections that would chill if the composition of the iron was not adjusted to prevent it. Therefore it is of importance in design to know what the strength will be at the center of a heavy section so that the calculation for strength of the section as a whole may not be in error.

No extensive comparison of the various properties is on record for very heavy sections. The data avail-

(CONCLUDED ON PAGE 48)



Treatment

“Ingots” of Ferron being extruded at the Sharon Steel Corp. plant.

By N. J. RANNEY
Research Engineer, Wean Engineering
Co., Warren, Ohio

MANY steel executives and engineers are today confronted with the problem: “What is the most economical method by which we can satisfactorily treat our waste pickle liquors?”

The answer in any particular case most definitely involves a study of the plant’s individual problem. This is due to a variation in a number of factors, such as the quantity of waste pickle liquor to be treated, the kinds of acid involved, the quantity of cleaning wastes and miscellaneous wastes to be treated, the frequency of discharge in each case, and seasonal variations in production.

Other points requiring consideration are compliance with governmental reg-

ulations, space available for equipment, cost of the raw materials, labor and power required, availability of a dump, and the existence of a use or market for a by-product. Finally, there are the important questions of whether the proposed plant for treating waste pickle liquor will satisfactorily meet future requirements with regard to production, regulations, and by-product and, if not, whether the proposed plant expenditure will at least be usable in meeting future requirements.

The methods of treating waste pickle liquor available today may be classified as follows:

(A) Processes resulting in the production of copperas, possibly incorporating the recovery of sulphuric acid.

(B) A process including a sulphuric acid plant for converting waste pickle liquors into concentrated sulphuric acid.

(C) Neutralization with lime or limestone, including the Ferron process, which produces a useful by-product.

The several processes covered by (A) and (B) involve the concentration of pickling wastes by some such

means as evaporation or refrigeration. Since pickling is done with dilute acids, this involves large quantities of steam, fuel, or power. It is not practical to treat pickling wash waters in plants of this type, and stainless steel pickling liquors must be treated separately.

The production of copperas, which is an end product of the processes under (A), is unsatisfactory from the standpoint of the industry as a whole, due to the fact that the market is quite limited. It has been suggested that the copperas be used as a raw material in the manufacture of sulphuric acid, but the economic advantage of this is doubtful, and it would involve a sulphuric acid plant such as is required under (B). Obviously the high initial plant expenditure and high operating and depreciation costs for the processes covered by (A) and (B) leaves a majority of the steel manufacturers with their problems unsolved.

Neutralization, as listed in group (C), is usually accomplished with lime

OF PICKLING WASTES . . .

or limestone. Most disposal regulations require that the combined acid, usually in the form of ferrous sulphate, be neutralized as well as the free acid. This makes the rather common practice of merely killing the free acid in lime settling basins obsolete, and requires the introduction of modern neutralization equipment.

If lime is used as the neutralization agent, this equipment consists of a slaker for mixing the lime with water to form a milk of lime, and agitating tanks for neutralizing the waste pickle liquor with the milk of lime.

Approximately 2 lb. of limestone are required to equal 1 lb. of lime in neutralizing properties. Limestone is relatively slow in reaction compared to lime and, in order to secure effective neutralization, it must first be finely pulverized. Even then the process requires greatly increased mixing capacity, aeration, and possibly the application of heat.

The question of how the neutralized slurry is to be disposed of must also be considered. In the case of some very small plants it may be satisfactory to discharge this slurry to a municipal sewer. Another possibility is to pump the slurry into lagoons and allow it to settle. However, lagooning the slurry is far from a satisfactory solution of the problem, since the lagoons fill up and it is then necessary to either dig out and haul away the precipitate, or to provide additional lagoons.

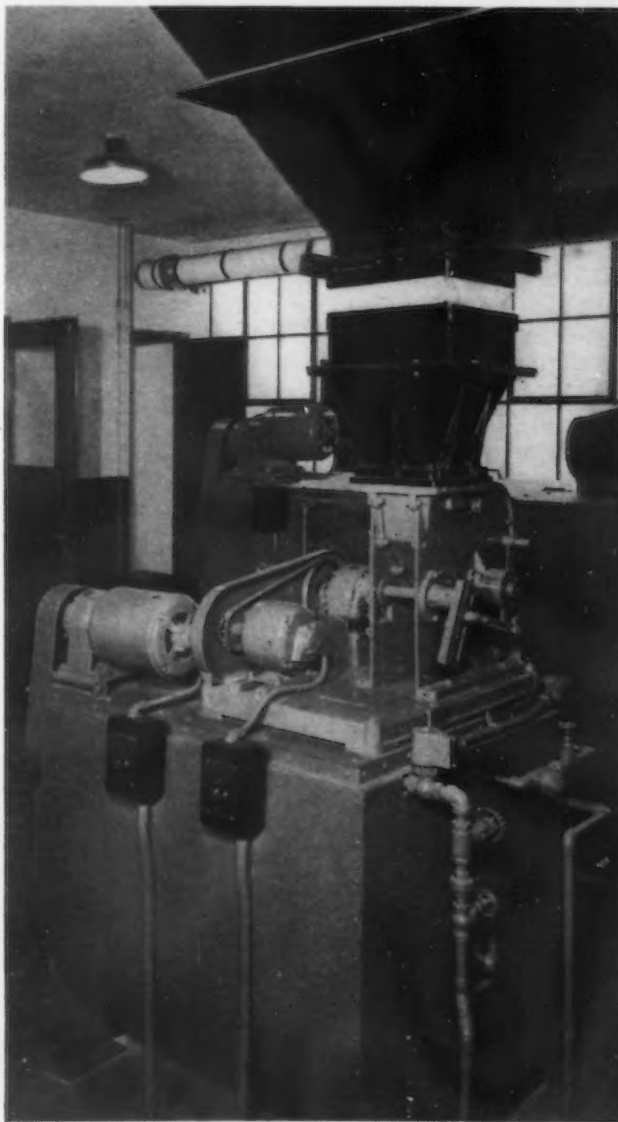
A more modern method of handling the problem is to filter out the solid material from the slurry by means of rotary vacuum filters or filter presses. This leaves the solids in the form of a filter cake containing about 50 per cent moisture suitable for disposal on a dump. The effluent from the filter is clear, neutral water. It is worth noting that if limestone is used as the neutralizing agent, some magnesium salts, which are very corrosive, may be dissolved in the effluent, whereas if lime

is used, the magnesium salts are precipitated.

An obvious objection to the above disposal procedures is that they are out-and-out overhead expenditures. For this reason, a great deal of interest has focused on the Ferron process, developed by the Allied Development Corp., which results in a useful by-product.

This process, which is now in operation at the Sharon Steel Corp., consists of controlled neutralization, followed by the removal of the solid material in a plastic state. This plastic material is then formed and dried, giving a new material of construction suitable for use as a heat insulator and as a gas purifier.

Continuous lime feeder and slaker.

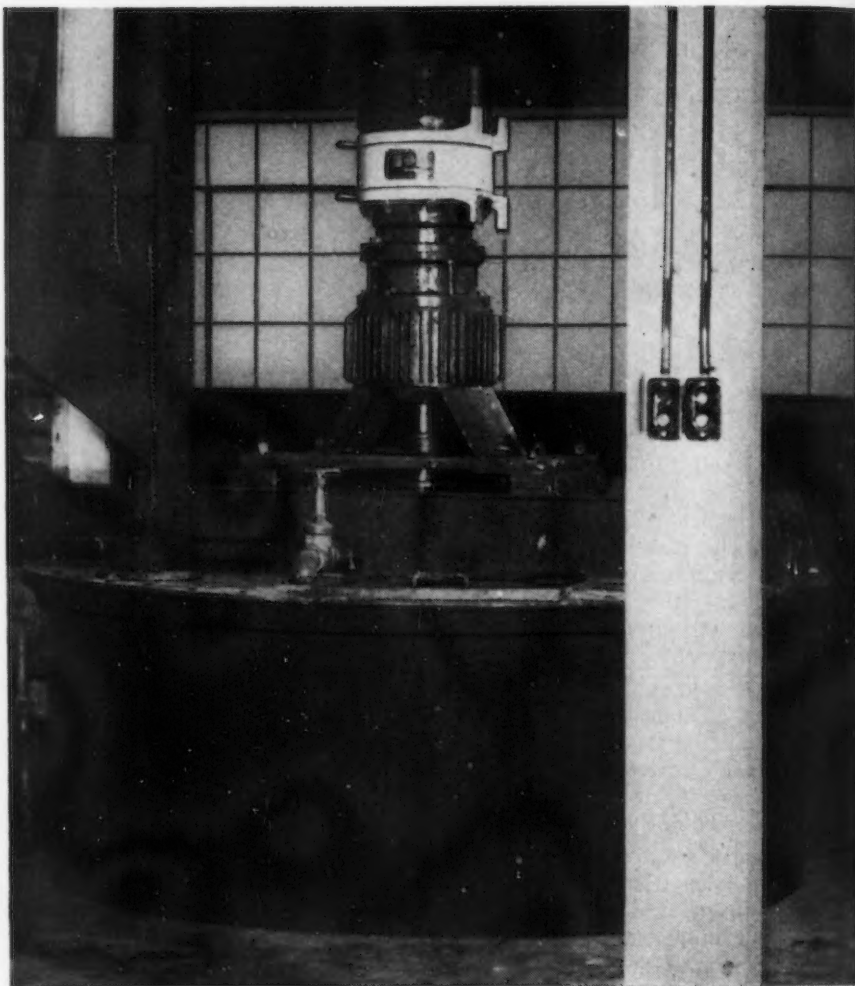


This brings up a very interesting and important point. An economical disposal plant has recently been developed by the Wean Engineering Co., Inc., Warren, Ohio, which can be operated on a throw-away basis and at the same time involves essentially the same equipment as the first part of a Ferron plant. By installing

equipment of this type the manufacturer has not only solved his immediate problem, but is also prepared from the by-product standpoint. As soon as a market for the by-product is established which will justify the expenditure, the additional forming and drying equipment to constitute a complete Ferron plant can be installed, or, what is more likely, the output from several disposal plants, while still in its plastic state, will be sent to a central plant for final processing.

This new type of disposal plant can treat any amount of acid rinse water, and can utilize alkaline cleaner wastes and acetylene plant wastes. All ordinary pickling acids, such as muriatic, nitric, and hydrofluoric acids, can be neutralized along with the sulphuric acid wastes. The muriatic and nitric salts are to some extent soluble in the effluent, while the calcium fluoride will be precipitated and removed by the filter.

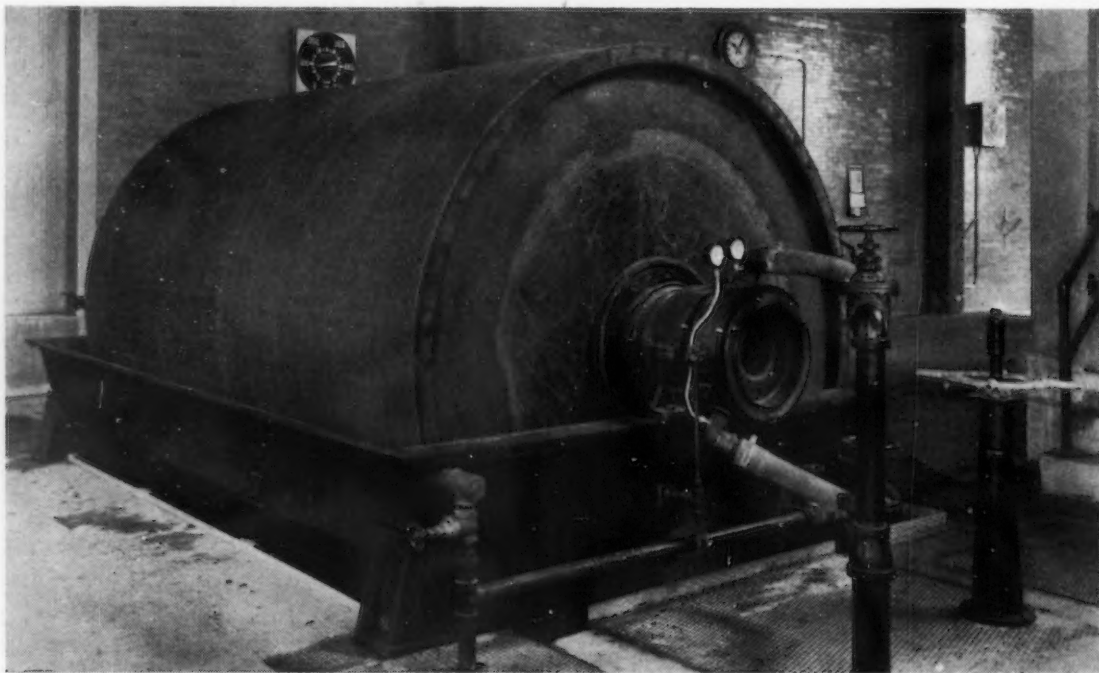
The Ferron plant at the Sharon Steel Corp. has complete equipment for neutralizing, filtering, forming and drying. Because this was the first installation, and was, to a large extent experimental, it was decided to take advantage of the increased flexibility offered by batch operation, and to keep the capital expenditure to a minimum. Much valuable operating data have now been obtained from this plant, and the steel industry owes a debt of gratitude to the officials of the Sharon Steel Corp. and to Mr. G. S. Warren, Chief Engineer, for doing the pioneering.



Neutralizing tank with agitator.

o o o

BELOW—Continuous rotary drum vacuum filter, satisfactory for steel mill disposal plants. The drum is porous. As a vacuum is set up inside it, water from the tank is sucked through the surface



of the drum, and the solid material adheres to the outside, and as the drum slowly revolves, the material dries. The vacuum is then broken and the solid material is deposited on a belt conveyor below the floor. Photo taken at a Cleveland municipal disposal plant.

o o o

Since the installation of the Sharon plant, the Wean Engineering Co., Inc., has been licensed for the engineering and construction of plants under this process. The newly developed disposal plant is arranged for continuous and practically automatic operation, as follows:

Waste sulphuric acid pickle liquors and wash water are collected in a central sump. If stainless steel pickle liquors and other wastes are to be treated, it is advisable that these be collected in a separate sump, and bled into the sulphuric acid waste liquor sump at a uniform rate.

Burnt lime with a maximum lump size of about 2 in. is brought to the plant in bulk, and is conveyed from the box car to a storage bin by a pneumatic conveyor or by screw conveyor and bucket elevator. High calcium

lime is desirable if the plant is to be operated on a throw-away basis, although a magnesium lime might be preferable in the manufacture of Ferrom. From the storage bin the lime is fed through a feeder to a continuous lime slaker, where it is converted into a milk of lime.

Waste pickle liquor from the storage sump is pumped at a constant rate to a small pre-mix tank where it is thoroughly mixed with the controlled overflow from the lime slaker by means of violent agitation.

From the pre-mix tank, the slurry flows by gravity to a larger circulating tank with sufficient holding capacity to insure complete neutralization. The gravity overflow from the circulating tank flows to a continuous rotary drum vacuum filter.

The rate of flow of milk of lime to

the pre-mix tank is automatically controlled by a pH cell which indicates the degree of neutralization. This insures complete neutralization without any waste of lime.

The vacuum filter removes the solid material from the slurry, producing a firm filter cake having a moisture content of about 50 per cent. This cake is discharged to a belt conveyor leading to a dump car. The effluent from the filter is clear, neutral water, which is pumped to a water storage tank. This supplies all the water needed in the process for slaking lime and, if necessary, for diluting the waste pickle liquor. Any excess water is entirely satisfactory for discharge to streams. With the exception of the labor occasionally required for unloading lime and loading the waste product, only one man is required to operate the average plant.

Large Tools Required for Grinding Huge Telescope Mirror

THE 82-in. mirror, which will be the heart of the reflector telescope for the new McDonald Observatory in West Texas, has been completed by the Warner & Swasey Co., Cleveland.

Photo shows Warner & Swasey officials looking on as the 3-ton, 82-in. glass disk went into the specially built aluminizing cell where its coating of chromium and aluminum was applied by an atomic bombardment. Dr. John S. Plaskett, consultant on telescope design; H. L. Cook, director of the instrument department; C. A. Robert Lundin, director of the optical department, are seen (left to right) at the cell, as Warner Seely, secretary, (at left), looked on.

The 82-in. mirror is exceeded in size only by the 100-in. mirror at Mount Wilson in California. It is made of pyrex glass, is 12-in. thick and weighs nearly three tons. It has a concave surface approximately 1-3/10 in. deep.

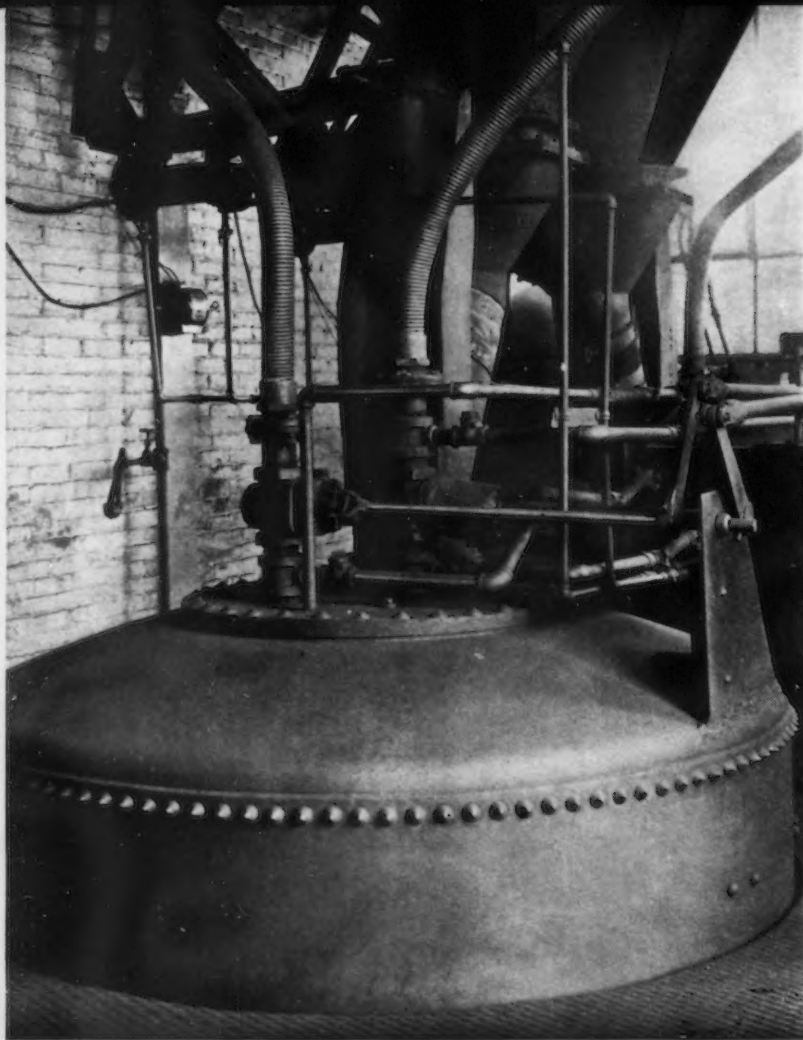
The grinding and polishing operations have been in progress since Oct. 30, 1934, in a machine specially designed by C. A. Robert Lundin, director of the Warner & Swasey optical department.

The cutting tool used in the process weighed 2300 lb. At the outset, No.

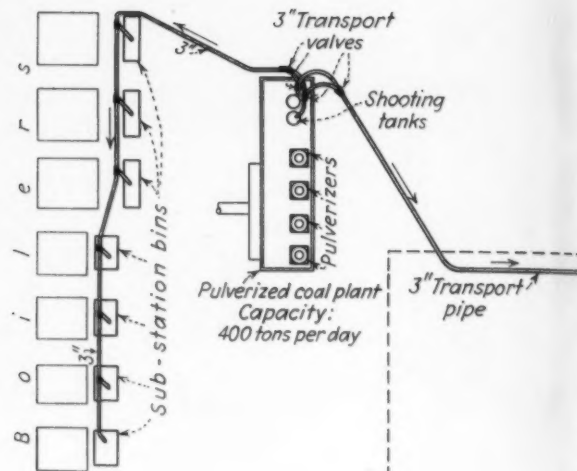
20 carborundum was the abrasive used. The size of the grains was reduced progressively over a period of nearly 40 weeks until a grain size of 220 was reached, when emery of equivalent fineness was substituted. Following

approximately 2½ weeks of grinding with emery of increased fineness, the glass was ready for polishing. Rouge, otherwise known as chemically pure iron rust, was employed for this painstaking operation now completed.





Pneumatic



UPPER LEFT

FIG. 2 — Upper portion of shooting tank showing the flexible pipes used for venting and discharge. This tank rests on a beam scale.

By C. F. HERINGTON
Engineer, Amsler-Morton Co.

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A PIONEER system used for transporting materials by the use of compressed air was the one leased by the United States Government for the transportation of mail in tubes underneath the streets of New York City, from the 23rd St. branch postoffice to the old main postoffice building at Park Row and Broadway. This system was in successful operation for approximately 25 years and was only recently abandoned because of the demolition of the postoffice.

During that period many transport systems have been designed and installed for the handling of various materials by compressed air. Most of the pneumatic systems have proved practical in operation, although the amount of power used and maintenance cost of the various systems have varied greatly.

To many engineers the idea of transporting materials by air, in closed pipes, has been objectionable because of fear of stoppage in the line, accompanied by inconvenience and, perhaps, danger. But, it has been the writer's experience, over the past 20 years, that such fears are not well founded, because no stoppage or plugging of air transport pipes has resulted in any ill effect up to the present time, nor need stoppages ever occur if ordinary sensible precautions are taken, and maintained, in the operation of these systems.

The advantages of a totally enclosed system that will handle finely divided and frequently inflammable and explosive materials safely and inexpensively need not be elaborated upon at this time. They are quite obvious.

Pneumatic transport systems may be divided generally into two classes: (1) those systems using a screw pump feeder, and (2) those systems which do not require the pump. In

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RIGHT

FIG. 1 — Improved system for long distance transport of granular materials. This system was originally designed to handle pulverized coal.

TRANSPORT OF GRANULAR MATERIALS

both systems an enclosed transport tank and weighing scales are utilized as a starting point, the tank being filled with a granular material such as pulverized coal from an overhead storage bin.

One pneumatic transport system widely used in conveying cement, coal, and other granular materials embodies four elements: (a) A screw pump, driven by a motor, which is used to control the amount of material

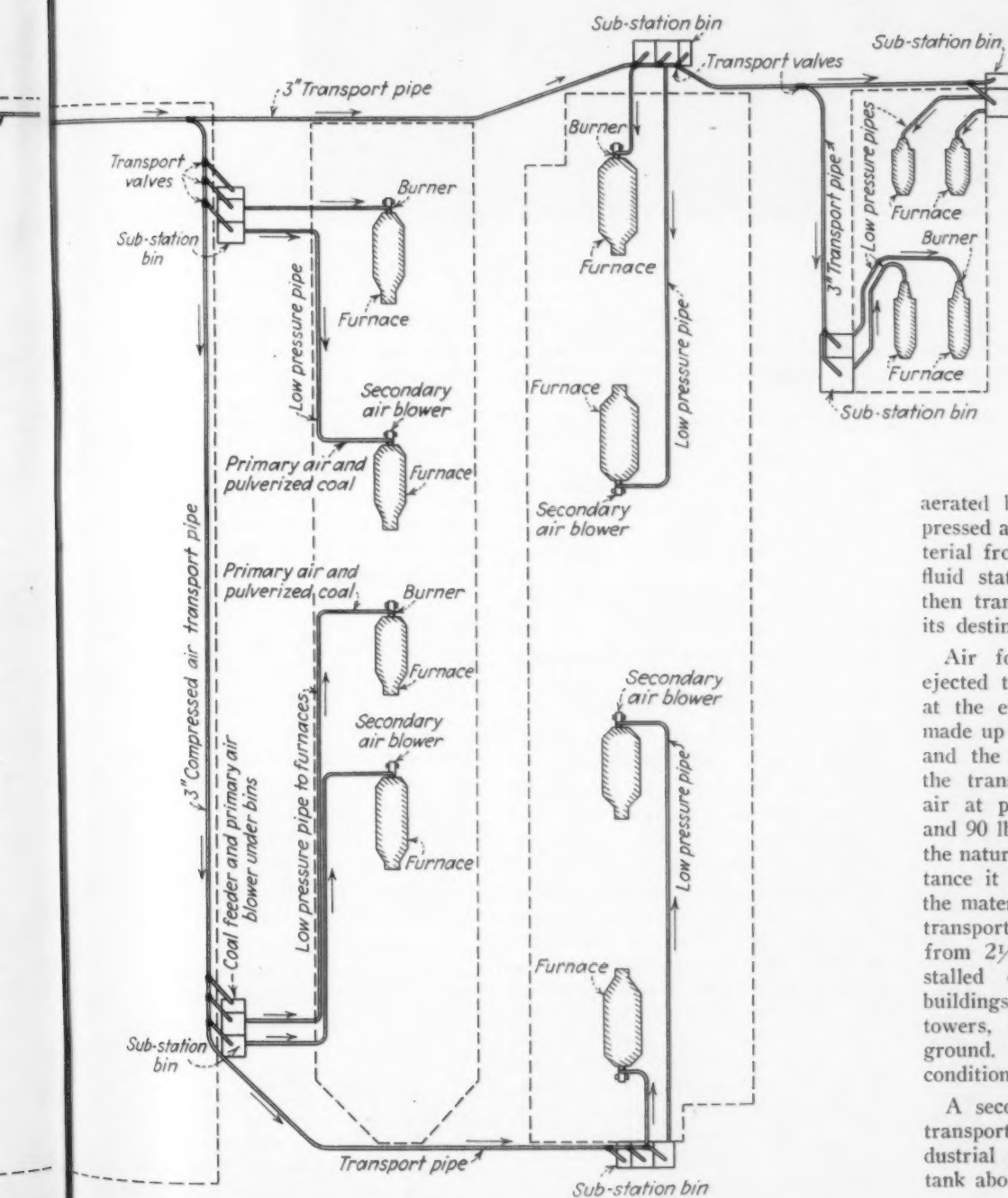
discharged from the tank into the transport pipe; (b) a supply of dry compressed air at various pressures for aerating and forcing the material through the pipe; (c) a transporting pipe of sufficient area to permit a suitable velocity; and (d) diverting or control valves to control the flow of the material from the transport pipe and deliver it into storage bins at various delivery points.

In such systems the screw pump is fed by gravity from the transport tank. It may also be fed directly from the pulverizer discharge, or by means of a screw conveyor receiving the product from any number of grinding mills or bins. At the discharge end of the screw pump the mass of material is

aerated by a small amount of compressed air in order to change the material from a dense mass into a semi-fluid state, in which condition it is then transported through the pipe to its destination.

Air for aerating the material is ejected through an air ring—located at the end of the screw pump and made up of a number of small slots—and the aerated material drops into the transport pipe where additional air at pressures varying between 5 and 90 lb. per sq. in., depending upon the nature of the material and the distance it is to be transported, carries the material through the system. The transport pipe line varies in diameter from 2½ to 8 in., and may be installed overhead inside the plant buildings, outside on roofs or elevated towers, or may be buried underground. Neither bends nor climatic conditions effect the operation.

A second system designed for the transporting of pulverized coal in industrial plants employs an enclosed tank about 3 ft. in diameter by 16 ft.



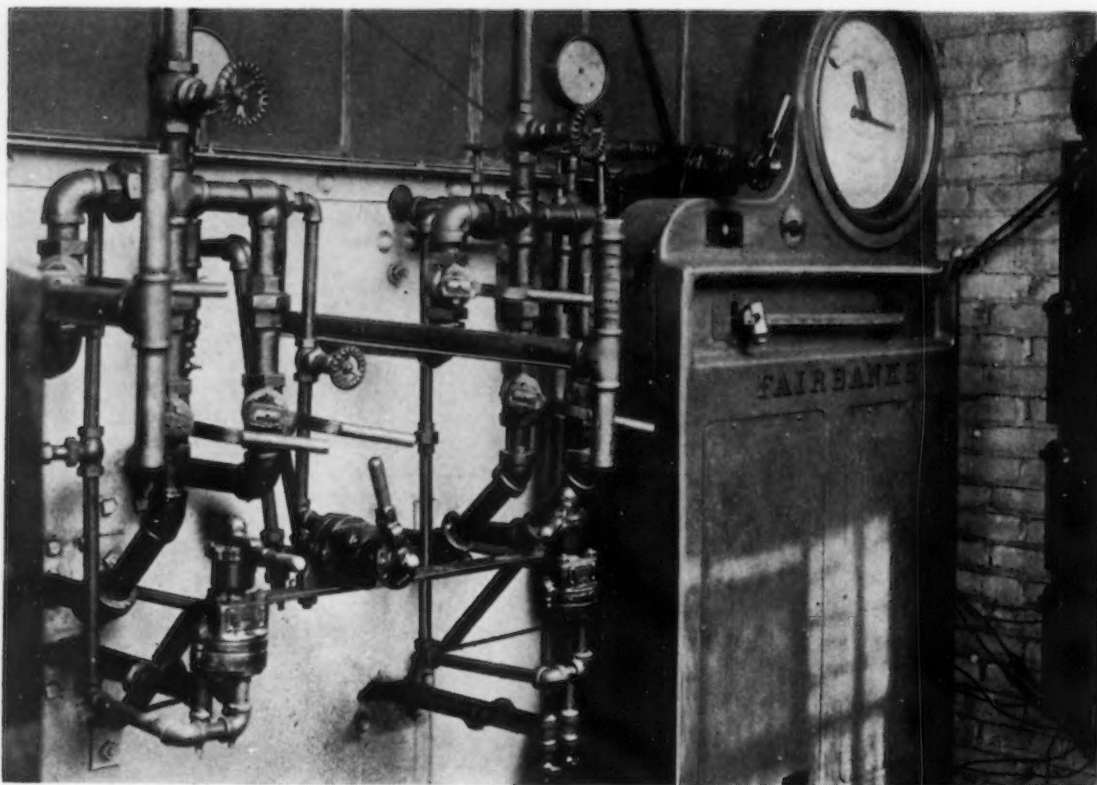


FIG. 3—Air and hand-operated valve handles required to manipulate the different tank operations. One of the scale dials is also shown.

high which stands on a platform scale. This tank is charged with coal by gravity from an overhead storage bin, after which compressed air is used to build a pressure upon the volume of coal in the tank until the desired pressure (depending upon the distance the coal is to be transported) is reached. The bottom discharge pipe of the tank is then opened and the accumulated air in the tank acts as a piston forcing the coal out of the tank bottom and through the pipe to its destination.

The bins at the delivery end are provided with small diameter cyclone collectors which receive the coal to be delivered into the bins. This system is both dirty and wasteful of coal because the packing of an air pressure on top of the coal in the tank results in the coal arriving in the collectors in the form of slugs, that is there will be a pipe full of coal about a yard long, then a similar pipe full of air. Quantities of fine coal dust are vented into the surrounding atmosphere by the collector and settle in the immediate vicinity.

A third, improved, pneumatic transport system, originally designed especially to carry pulverized coal, has proved to be a most economical means of conveying powdered coal or other granular materials over long distances.

Fig. 1 shows a plan layout of one of these systems. The coal plant is located at a distance of from 1500 to 1600 ft. from the most distant substation bin receiving the coal.

The details of this transport system can be described as follows: Beneath the pulverized coal storage bin, in the coal plant, into which all of the pulverizers discharge their product, there are installed two enclosed transport or shooting tanks. These rest on scales for weighing the amounts of coal being transported, and they may be apportioned to the furnaces, or group of furnaces, to which the pulverized coal is to be delivered.

Fig. 2 shows the upper portion of these shooting tanks and the flexible piping used for the tank venting and discharge pipes. In this system the coal is discharged from the tops of the enclosed tanks rather than through the bottoms as in the other two systems described. Gate and bell valves in these pipes are operated from the control room (Fig. 3) which contains the scale dial registering the amounts of coal in the tanks. From this control room, by means of a panel board (Fig. 4), and remote control valves, the coal plant operator may also regulate the distribution of the coal, as will be discussed later.

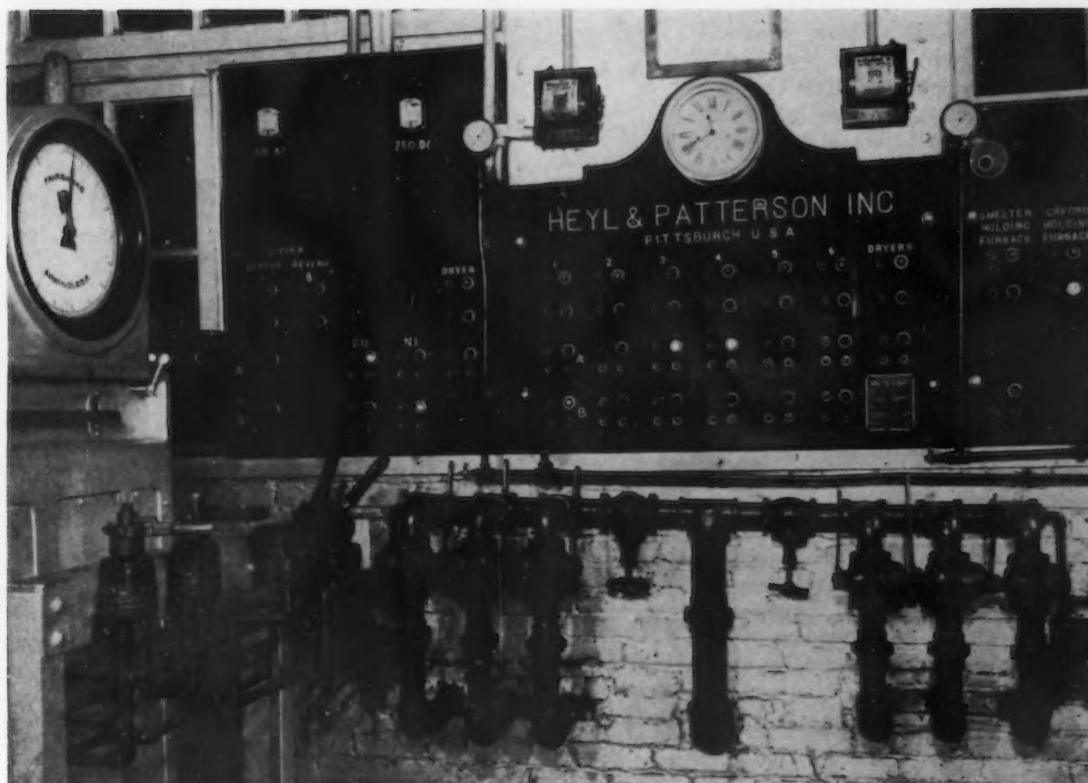
Fig. 5 shows the general arrange-

ment of two transport tanks located at an installation in Canada having a pulverized fuel capacity of approximately 85 tons of coal per hr. In this particular installation the coal is transported through a 5-in. diameter steel pipe to any one of six reverberatory furnaces and also several nickel casting furnaces. Two lines of transport pipe are used from the coal plant to the storage bins located at each furnace. These pipes are not enclosed in any manner and have been subjected to temperatures as low as 22 deg. F. below zero without trouble of any kind. This system was placed in operation in 1930.

In operating the transport or shooting tank, the vent valve is first opened to relieve the air pressure in the tank from previous operation. Then the discharge valve is opened, followed by the storage bin gate, so that the coal immediately flows down into the tank.

It requires but two minutes to draw 14,000 lb. of coal into the tank. The bin gate is then closed, followed by closing the discharge and vent valves. The tank is now closed tight. An air supply valve is opened which admits dry compressed air from the reservoir at 80 to 90 lb. pressure. This air travels down through the pipe shown in dotted line, striking the bottom of the tank at high velocity and turning back

FIG. 4 — Panel board scale dial, and operating valves for the two transport tanks.



into the body of coal, thus aerating and fluffing the fine coal. This mixture of coal and air attains a pressure of 45 to 70 lb., which is indicated by the tank gage. The pipe through which the air has been entering the tank also serves as the coal discharge pipe. The air is now shut off from entering through this pipe and compressed air at reservoir pressure turned into the tank through another connection forcing the mixture of coal and air through the discharge pipe to the transport line for delivery to destination. The movement of the coal can be followed by observing the movement of the scale dial pointer as the coal leaves the tank.

The tabulation in Table I shows the time consumed in emptying the tank, together with the pressure changes as the coal and air leave the tank, and also the pressure of air being delivered to the tank. The line distances are from 1500 to 1800 ft. with curves and varying elevations with bends not calculated in the lineal distances cited.

Compressed air, in this system, is used only during the period the 14,000 lb. of coal are being aerated and discharged. But, in the systems using the screw pump, the compressed air is used continuously during the day's run.

As soon as the scale shows that the tank is about empty, the air is shut off, and, when the scale pointer registers zero, another valve is opened and compressed air at reservoir pressure is for a moment admitted direct to the transport pipe. This is done for the purpose of cleaning out the transport

pipe from the tank to the furnace storage bin.

Each furnace storage bin, in the installation under discussion, is fitted with electric indicator switches arranged to operate when the bin is empty and filled. These switches are connected to electric lights on the panel board shown in Fig. 4 and 5. When a red light shows on the panel, the operator is warned that a bin is nearly empty; so he sends coal to that bin until a white light appears on the panel, indicating that the bin is full. However, it should be noted that the location of the white light bin indicator is such that there is always unfilled space in the storage bin to receive the balance of the coal in the transport tank and line without danger of overflowing. Also, it is possible for the coal plant operator, when a white light appears on the panel, to close at once the delivery valve on that particular bin, allowing the coal to proceed along the transport pipe to the next opened delivery valve. A green light appears on the panel board whenever the delivery valve to a storage bin is open.

Advantages of System

The air consumption per ton of coal transported varies greatly between this system and others. Tests taken at a

TABLE I
Time and Pressure Changes During Discharge of Tank

Time (March 19, p.m.)	Pounds of Coal	Tank Pres- sure	Reser- voir Pressure
2:295	14,000		90
2:30	aerating the coal		
2:315	valve opened	80	88
2:32	10,800	70	88
2:325	7600	65	88
2:33	5000	64	86
2:335	2500	60	88
2:3375	air turned off	40	88
2:34	450	40	90
2:345	coal all out of tank; time—5 min.		
(March 19, p.m.)			
2:525	14,000		90
2:5325	aerating the coal		
2:545		80	88
2:55	11,300	67	88
2:555	8200	65	88
2:56	5800	60	88
2:565	3500	58	88
2:57	1800	55	88
2:575	500	30	90
2:58	Coal all out of tank; time—5½ min.		

power plant using a screw pump having a capacity of 20 tons per hr. show an air consumption of 1000 cu. ft. of air, at 60 lb. gage pressure, per ton of coal transported. And further, the power input to the pump motor amounted to 0.85 kw. per ton of coal transported.

In an improved transport system, without a screw pump, installed in 1930, the user, after three years' operation, indicates that it is possible to convey—for distances up to 1500 ft.—with 700 cu. ft. of air, at 60 to 70 lb. gage pressure, per ton of coal transported. This operator has transported, during the three-year period, 73,714 tons of coal, with a total cost for repair and maintenance of \$287.40, which amounts to \$0.0038 per ton. It may be noted that the coal was transported in 5-in. pipes in temperatures as low as 22 deg. below zero. This system is now in regular daily operation.

Another user of a similar system, using 3-in. pipe, reports, after using the system for the past 11 years, that the total cost of transporting coal was \$0.01 per ton. During this period no major repairs were necessary.

A third system of the same kind has been in constant use since 1924 and is giving satisfactory service today in the economical transporting of coal to a number of furnaces.

The success of these applications, and the progress in design and construction which has accompanied the development of this system, indicate that the use of the air transport sys-

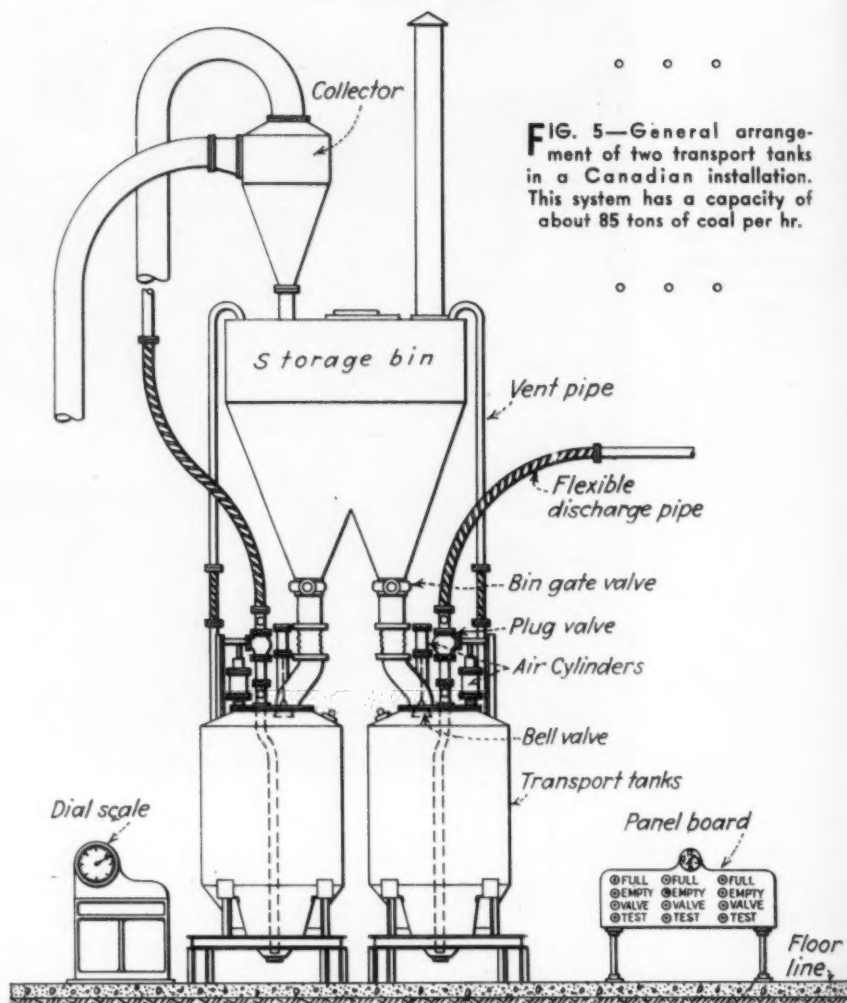


FIG. 5—General arrangement of two transport tanks in a Canadian installation. This system has a capacity of about 85 tons of coal per hr.

tem for conveying pulverized materials such as flour, cement and coal might be extended considerably. The

facts point toward increasing efficiency in this method of materials handling and accompanying lower costs.

Test Shows High Abrasion Resistance of Enamels

THE development of a tentative standard test for abrasion resistance of porcelain enamels has brought to light some interesting evidence regarding the comparative wear-resisting qualities of various finishes or surfaces.

The test was developed as one of the activities of the technical research section of the Porcelain Enamel Institute, the work being conducted by W. N. Harrison of the National Bureau of Standards and Dr. Paul L. Smith, research fellow of the Institute.

While the major purpose of the

research was to devise a standard test which might be utilized in any enameling plant laboratory, considerable by-product information was obtained. The result is that the abrasion resistance test may find application not only in the enameling field, but also in the case of other materials having at least moderately smooth and glossy finishes, such as glazed ceramic ware, glass, plastics, paints and lacquers.

As an example of the type of information obtained during the research the accompanying table (from Bureau of Standards bulletin No. 247) shows

some comparative values obtained in the testing procedure. The values given in the table are not comprehensive, but are merely illustrative of some that have been obtained.

Duration of Treatment Required 50 Per Cent Loss of Original Specular Gloss

Material	Hundreds of Strokes
Dinnerware	96
Hard, acid-resisting enamel	87
Low priced dinnerware	78
Medium vitreous enamel	55
Polished plate glass	45
Soft vitreous enamel	34
Very soft vitreous enamel	14
Baked organic coating	7
Soft organic coating	4

REAR axle differential gear cases as used for contractors' trucks and farm tractors have to take heavy punishment and maintain their size and shape under the high torque loads and stress frequently encountered in the field. An iron devised specifically to meet such demands, a form of the so-called pearlitic malleable irons, is now being produced by Belle City Malleable Iron Co. and has found favor among certain truck and tractor builders.

This iron, called Belmalloy, is a distinct type of ferrous casting in structure and physical properties, and because of its properties is said to fit into the field between malleable and steel castings.

The metal is melted in the electric furnace in 5-ton lots similarly to steel castings in order to secure the advantage of the high temperatures, refining action, and thorough mixing of the bath in electric melting. This results in the most nearly perfect solution and assimilation of all constituents, completion of the deoxidizing reactions of the constituents on the furnace hearth rather than in the ladle, and the close control of composition essential to providing a dependable base metal that will respond uniformly to heat treatment.

The heat treatment is carried out in a Dressler Tunnel Kiln. This continuous oven annealing process permits precise regulation and insures the breaking down of all the massive cementite of the original white iron into tough, machineable lamellar pearlite. Castings from the Dressler Kiln are completely relieved of internal stresses because of the extremely slow rate of cooling in the last phase of the heat treating cycle. This gives freedom from later distortion in use, that

Pearlitic Malleable Iron

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is, distortion traceable to unrelieved stresses.

The microstructure of Belmalloy shows similarities to steel on the one hand and regular malleable on the other. The nodules of temper carbon characteristic of malleable are retained, but are found more sparsely scattered in a matrix of lamellar pearlite, stronger and harder than the ferrite matrix of malleable. This pearlite matrix is almost identical with the matrix of steel castings and shows practically the same strength, but is said to be more readily machineable, due to the presence of temper carbon.

To test for machining quality, a spider of a two-piece differential case was set up on a turret lathe with cutting tools of J-Stellite. A roughing cut, having a depth of $\frac{1}{8}$ to $\frac{3}{16}$ in., was made at 100 surface ft. per min., with a feed of 0.040 in. per revolution. The finishing cuts were made at from 128 to 165 surface ft. per min.

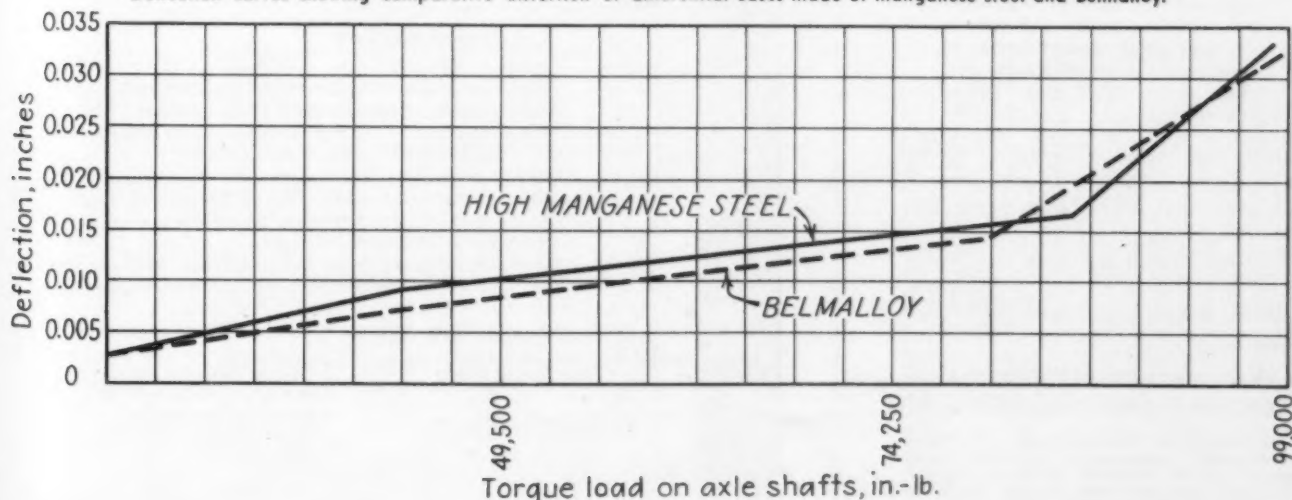
As regards rigidity, a prime essen-

tial for heavy duty differential gear cases, the yield point and modulus of elasticity of a metal are the ruling factors. The yield point of this iron is said to be high, ranging closely between 45,000 and 55,000 lb. per sq. in. The modulus also is said to be high, ranging between 28,000,000 and 34,000,000. Tensile tests have shown strengths of from 75,000 to 85,000 lb. per sq. in.

The results of some tests made by the Belle City company to determine the relative rigidity of differential cases are shown in the accompanying graph. The curves show the comparative distortion of differential cases made of manganese steel (solid line) and Belmalloy (dash line), as made on a machine developed for this specific purpose. The steel castings had a minimum tensile strength of 100,000 lb. per sq. in. and yield point of 60,000 lb. per sq. in. It will be noted that Belmalloy is indicated as showing no appreciable difference from the steel castings in distortion under load at any point between loads of 25,000 and 99,000 in.-lb.

The Brinell hardness of the iron is said to range between 179 and 217, which is higher than malleable and even higher than medium carbon steel. This high hardness is claimed to enable Belmalloy cases to withstand the progressive loosening up of the ring gear caused by pining at the rivet holes and loosening of the rivets holding the ring gear and the gear seats of the differential pinions. The hammering action which takes place when this assembly loosens up eventually causes the rivets to shear off. The hardness of the iron enables it to withstand the brinnelling action on the bearing trunnions. Hardness is also, of course, a considerable element in wear resistance.

Deflection curves showing comparative distortion of differential cases made of manganese steel and Belmalloy.



Iron and Steel Descaled and Structural Steel Cleaned and Dehydrated By Oxy-Acetylene Process

By J. G. MAGRATH

Applied Engineering Department,
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THE effectiveness of a high temperature flame in removing scale from iron has been known for many years. In 1928, G. F. Wieser* described the method as follows:

The operation consists of putting a large size welding tip in the torch and adjusting the gas pressures so that a somewhat oxidizing and blasting flame is produced. By sweeping this flame over successive small areas of the surface to be cleaned, the expansion effect of the intense heat and the blast of the flame is sufficient to loosen and remove the scale which consists largely of burnt sand and metallic oxide and which varies widely as to weight and thickness.

Although the advantages of the method are obvious, it is only recently that general industrial conditions have provided the incentive for its adoption. There is no other apparent reason, because application of the method presents no difficulty and raises no serious problems.

All the necessary equipment is available or can be improvised without dif-

*In a paper on "Oxy-Acetylene Welding In the Foundry", presented at a welding conference held at the University of Wisconsin, Feb. 8-10, 1928, and published by the Air Reduction Sales Co. Copyrighted 1928.

ficulty. The technique is sufficiently analogous to familiar welding and cutting operations with oxy-acetylene torches that any competent operator in this field is equipped to install and operate the flame method of descaling.

Although the method presented in the following discussion is not new,

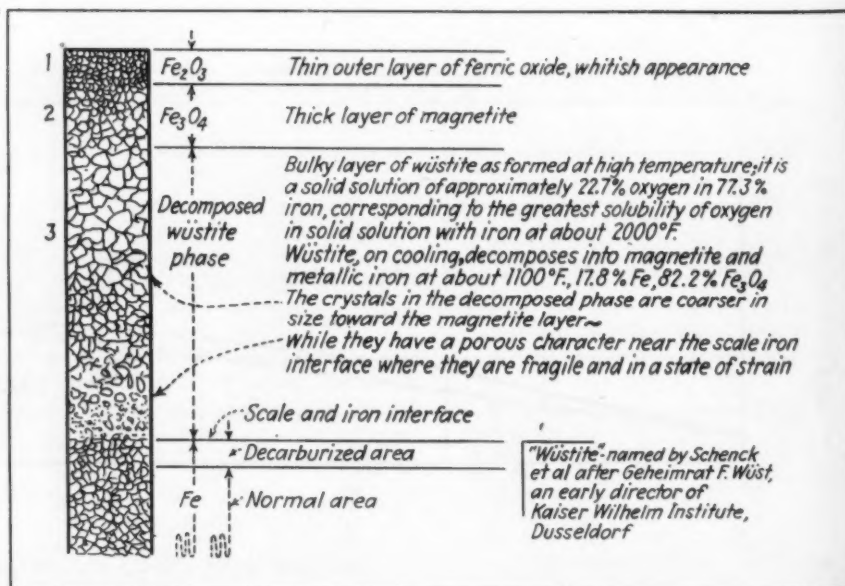
there have been developments leading to a number of interesting new applications. Industry has gradually recognized that thermal scaling of ferrous metals is a cause of manufacturing difficulties and wasteful maintenance expenditures, and this has resulted in correspondingly wider interest in means for the rapid removal of surface accumulations of this kind.

The presence of scale on steel billets prevents close inspection for locating minute defects and fine seams prior to flame scarfing or chipping. Hard adhesive scale on rolled stock, castings and forgings is damaging to cutting tools in the first machining cut. Loose porous scales can retain or concentrate corrosive substances, thus increasing the rate of attack on the metal surface beneath. In the case of structural shapes and ship plates, the loosening and weathering-off of scale, and with it the paint, attributed to occluded moisture, necessitates more frequent paintings in the early periods of use. Because of these facts, an increasing number of steel specifications call for "steel free from scale and painted."

Before describing flame descaling equipment and its operation, some types of scale formation encountered will be considered.

The exact nature of scale formed on heated surfaces by oxidation has been

FIG. 1—Scale produced on iron at a high temperature in an air atmosphere.



the subject of varied opinion. Because of the friability of this scale it is difficult to prepare good micro-sections for examination. Owing to the complexity of the phase changes involved, particularly where alloys are present, it has not been easy to obtain a clear picture of scale formation.

Recent studies** indicate that three layers containing up to four phases are found in scale produced on iron at high temperatures in an air atmosphere. These various layers are pictured and described in Fig. 1.

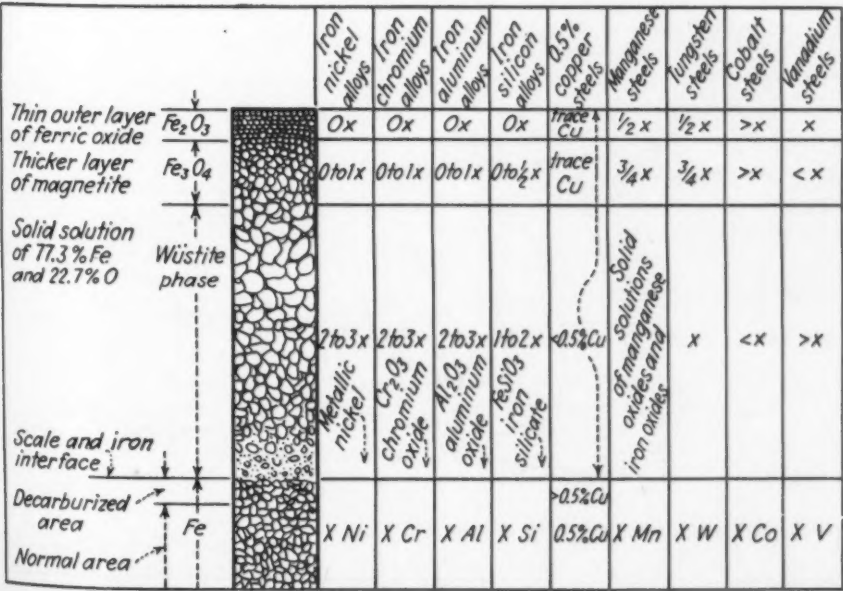
In alloy steels a number of published researches indicate that although small additions of alloying elements do not cause any fundamental change in the mechanism of oxidation, there does result in many cases a difference in the constitution of the scale deposit which is reflected in the relative difficulty experienced in removing certain types of scale. These variations are charted in Fig. 2.

The Wüstite Phase

The decomposed wüstite phase should not be found where scale is pro-

**See summary of investigation of the mechanism and rate of oxidation of metals and alloys in different atmospheres outlined in the "Review of Oxidation and Scaling of Heated Solid Metals", by the Department of Scientific and Industrial Research, London. This publication is available through H. M. Stationery Office, Adastral House, Kingsway, London, W.C. 2.

FIG. 2—Analysis of scale produced on alloy steels at high temperature in an air atmosphere.



> Signifies Greater < Signifies Less

RECENT developments in flame descaling, in which scale deposits are removed by rapidly heating them with a multi-flame oxy-acetylene tip, are here outlined. In this process, which is applicable to rolled steel, forgings and castings, the scale is cracked off as a result of the differential expansion between the scale and the base metal. This section of the article includes data on the formation of the various types of scale encountered.

In flame cleaning and dehydration, discussed in the concluding part of the article, a high temperature multi-flame tip is employed to drive out occluded moisture within and beneath the surface scale of structural shapes and plate. The purpose is to assure an ideal surface for painting.

duced at a temperature below 1100 deg. F. The scale layer adjacent to the iron will consist of magnetite or ferric oxide. When oxidation occurs at a temperature above 1100 deg. F. in an atmosphere deficient in oxygen, only the decomposed wüstite phase is present and this scale is different in appearance from that in which the ferric oxide and magnetite layers are found. The matte surface of the latter type of scale is replaced by idiomorphic crystalline growths.

Magnetite, Fe₃O₄, predominates in scales formed in an air atmosphere, while scales formed in steam, carbon dioxide and mixtures of these with or

without carbon monoxide or hydrogen at 2000 to 2500 deg. F. consist largely of ferrous oxide, FeO. Scales formed under a deficiency of air, under steam or carbon dioxide, are difficult to remove.

Tests have indicated that when scale is formed at 1650 deg. F., medium-carbon steels (0.30-0.45 per cent carbon) scaled the most. Low-carbon steels (0.15 per cent carbon) developed a medium scale, and the high-carbon range (0.90-1.05 per cent carbon) scaled the least.

The ease of scale removal is not measurable by the thickness of the scale deposit. Thick scale is frequently more readily removed than the thinner scales, which may adhere to iron and steel with unusual tenacity.

Scale Broken With One Pass of Flame

Although it has been shown that three layers, different in composition, are found in scale formations, experience in flame descaling indicates that these layers have little bearing on the scale "break" lines developed under the flame. As a rule most scales will break completely with one pass of the flames, if the scale is of a nature that lends itself to flame descaling. Scale removed on the first pass will break at the scale-iron interface.

Certain scales, however, will require two passes. We name that layer removed on the first pass "top-scale" and the second layer, "bottom-scale." The break between the "top-scale" and "bottom-scale" may occur anywhere within the wüstite phase although generally the fracture will develop nearer the scale-iron interface. A few scales have been found to require three flame passes, fracturing at two break-lines, and therefore requiring the indexing of top-scale, middle-scale and bottom-scale. Fig. 3 illustrates these conditions.

On a number of rolled low-alloy steels, cooled very slowly under cover, and on some high-carbon steels a thin, solid faced, very tight scale is found. On other low-alloy and high-carbon steels, cooled in air, and occasionally on castings, the scale is fairly tight, visibly crazed on top but with a definite break at the scale-iron interface. Rolled sections of structural shapes, rolled plates and light forgings frequently develop a thin, solid-faced scale, generally with an intermediate break-line forming a top and bottom-scale and with a definite break-line at the scale-iron interface.

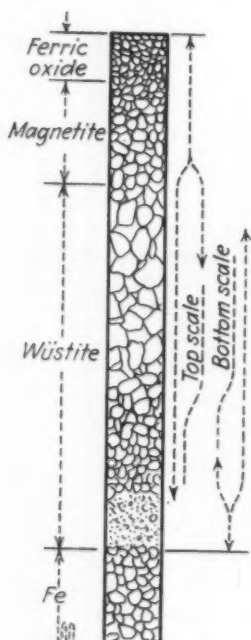
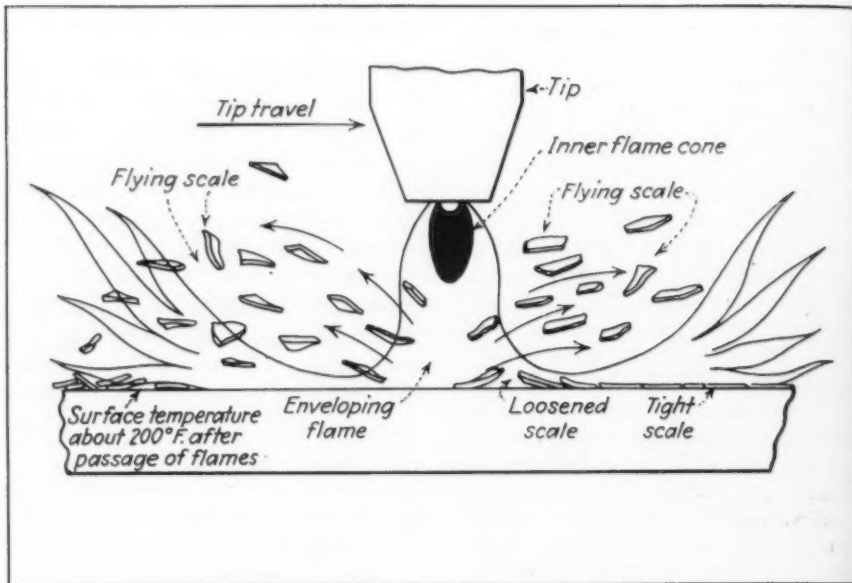
A medium thickness scale with a definitely cracked face for the depth

AT RIGHT

FIG. 4—Action of descaling flames. The high temperature flames result in a differential expansion, causing the scale to lift and fly off as shown.

o o o

of the top-scale and with an intermediate break between top and bottom-scale, but with or without a definite break at the scale-iron interface, is to be found on some steels subjected to pressure in slab and heavy plate formation. Scales on annealed cast iron or steel will generally be of medium thickness having a decidedly cracked face extending in some places for the depth of the top-scale and in other



AT LEFT

FIG. 3—Flame descaling - layer breaks. As a rule light and medium tenacity scales are removed with a single pass. Those having a tighter grip may require two passes, the scale expanding off in two layers. In exceptional cases three passes are required. These various layer breaks are termed "top," "middle," and "bottom" scale, respectively.

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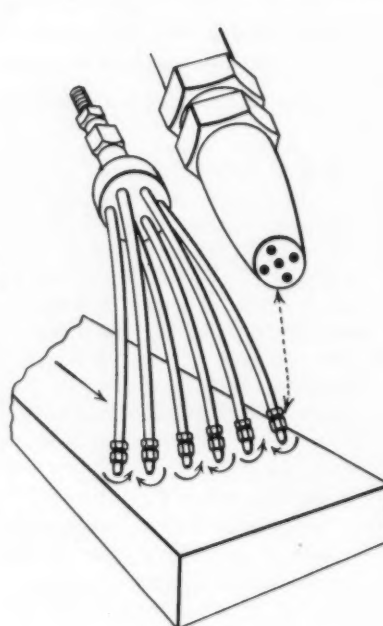
spots down to the scale-iron interface. Usually a break will be found at both levels. Slabs, heavy plates, and large forgings will develop a thick scale: when subjected to heavy or repeated pressures, this scale has a cracked face with partial or complete breaks between the top and bottom-scale and at the scale-iron interface.

Extremely tenacious scale is fre-

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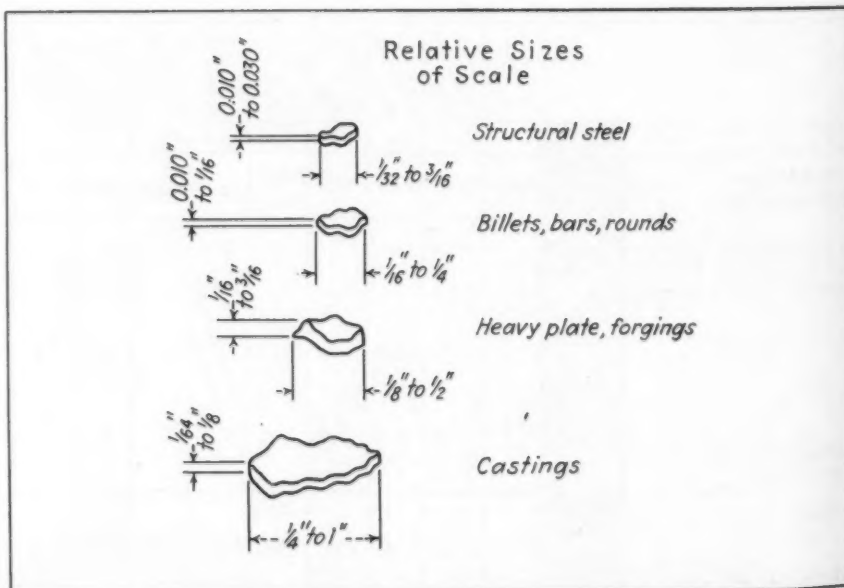
FIG. 5—The loosened scale particles vary considerably in size, as shown by this sketch. Variations in production, however, will frequently alter these findings.

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Tips grouped in close formation for concentration of flames

FIG. 6—Where, because of insufficient number of heated shapes, the use of a fitted tip assembly is not warranted, this flexible tube assembly may be used. The closed formation of this flexible assembly of six-tube, five-flame tips (at right) permits concentration of the flames.



quently found on some nickel-chromium steels. There appears to be preferential oxidation at the scale-iron interface resulting in the scale being firmly pegged into the steel. Descaling becomes very difficult because of this grain boundary penetration.

While the difference in grades and

ture thus applied the scale is rapidly heated without overheating of the base metal. A differential expansion results, causing the scale to lift, crack and fly off, as pictured in Fig. 4. The loosened scale particles will vary considerably in size, as shown in Fig. 5. While the sizes designated are the

hair lines. After pickling or flame descaling these are seen to extend for considerable length along the billet surface and frequently for the full length of the billet. The cleaned surface permits close inspection to determine the extent of surface to be conditioned.

Heat Treated and Bent Shapes Descaled

Scale formed on shapes that are heat treated or that are heated in a bending operation may be removed readily by this process. When these shapes are varied in contour and size and are insufficient in number to warrant the making of a fitted tip assembly, a flexible tube tip assembly, Fig. 6, may be employed. The tips are mounted on flexible copper tubes which may be

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BELOW

FIG. 8—Flame descaling billets with flat tip assemblies mounted vertically and at right angles for descaling two surfaces at one pass.



ABOVE

FIG. 7—Flame descaling billets with a flat tip assembly mounted vertically on a carriage for descaling a single surface in one pass.

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analysis of steels is in a large measure responsible for variations in scales, many other factors contribute to scale differences to a greater degree. Size of piece, finishing temperatures, surrounding atmosphere, methods of piling and grouping while hot, draughts, and methods of handling are among these. These factors may result in formation of different types of scale on pieces from the same heat of steel.

Flame Descaling Process Described

In flame descaling, the descaling tip is positioned so that the enveloping flame completely covers the scaled surface. By means of the high tempera-

rule, variations in production will frequently alter these findings.

As previously pointed out, steel billets are descaled prior to inspection to reveal seams and other defects. Where there is scale on the surface, evidence of seams will generally be found on the billet ends in the form of short edge

bent to span and closely follow a given contour. When a wide interval between the tips occurs, the entire assembly may be oscillated sideways in each direction while proceeding in a generally forward direction. Where concentration of the flame is desired this same assembly may be adjusted



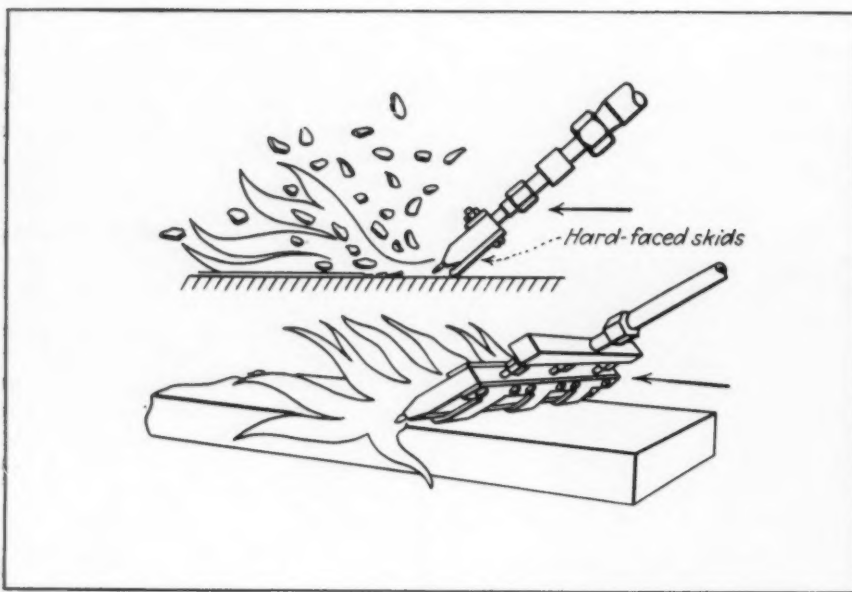


FIG. 9—An assembly of multi-flame flat tips on hard-faced skids may be employed where scale conditions permit.

so that the flames are bunched as shown.

On very thick pressed plate where extremely heavy scale is found, the concentrated flames of the round tip shown, Fig. 11, are of advantage. Some very tenacious scales require that the tip be held against the work at an angle, and for this purpose this round type tip is equipped with a hard-faced ring.

Flame descaling is frequently applicable to the removal of scale from castings. On large castings with flat areas and light scale deposit the flat multi-flame tip may be employed. Multi-flame round tips should be used for edges, corners and recesses and for castings having a heavy scale. Hollow cylinders and large pipe interiors may be descaled by means of a broad, flat multi-flame tip assembly mounted on a special carriage.

Flame descaling leaves a clean, natural surface. There is no chemical or physical action upon, or discoloring of, the base metal. The descaling is rapid, and the process is one that can be fitted into a production line.

Flame Cleaning and Dehydration of Structural Steel

THE process of flame-dehydration of structural steel and plate prior to painting is being given serious consideration and is being subjected to practical tests on exposed painted steel structures.

In theory, the occluded moisture present on scaled steel surfaces eventually creates a condition favorable to

the loosening of mill scale that would otherwise remain tight. It is the gradual loosening of this scale, due to the presence of moisture, that causes the flaking off of the paint. By quickly passing a high-temperature flame over the surface, the occluded moisture is driven from within and beneath the scale, leaving a warmed surface that provides good paint adherence.

Complete Scale Removal Not Required

It is not considered necessary, however, to remove all scale from the steel, but only that which will separate

under the concentrated action of the flame. It is felt that mill scale which withstands the action of the concentrated high-temperature oxy-acetylene flames is sufficiently tenacious to remain fixed after painting.

Immediately after the application of the flame the surfaces are hand wire-brushed and swept clean of loosened scale particles and dust. Cleaning by means of compressed air is not permissible as it would defeat the purpose of dehydration. Painting follows while the steel is still warm and in no case is paint applied more than 2 hr. after flame cleaning and dehydrating the surface. Operations and time intervals in this process are diagrammatically illustrated in Fig. 10.

In addition to the flat multi-flame tip assembly shown in Fig. 9, the round tip with double rings of flames, pictured in Fig. 11, has been found very effective, particularly when used in combination with the flat multi-flame tips on large structural shapes. The flat areas of such members may be rapidly cleaned and dehydrated with the flat multi-flame tips, and the edges and round corners are expeditiously handled with the round tip.

When fabricated girders and other structural assemblies are to be flame cleaned and dehydrated, the flat multi-flame tip assembly with hard faced skids (Fig. 9) may be used on upright plain surfaces, and the round tip at other points, including rivet heads.

Rivet heads, probably as much as corners and edges, present greater difficulty than other areas of fabri-

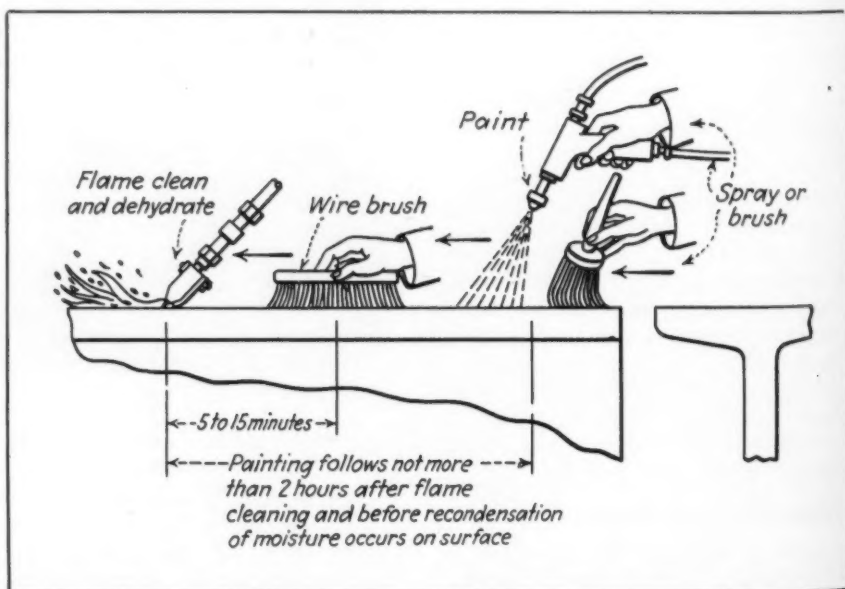


FIG. 10—Operations and time intervals in flame cleaning and dehydrating structural shapes and plate are portrayed in this sketch.

BELOW

FIG. 12—Flame cleaning and dehydrating the web plate of a fabricated girder, using a flat multi-flame tip assembly on an extension.



ABOVE

FIG. 11—Flame cleaning and dehydrating at juncture of angle clip and fabricated H-column, using a round tip on an extension.

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however, the true surface condition quickly becomes apparent. Seams between gusset plates and sections, edges and corners are likewise points where moisture lodges when loose scale is present. Eventually the moisture penetrates the partially loosened scale and attacks the metal. By means of flame descaling such recesses can readily be cleaned. Fabricated girders, flat surfaced bays and spandrels of other members may be cleaned and dehydrated with the flat multi-flame tip. Applications of this kind can be made either in the fabricating shop or in the field.

cated steel, loss of paint due to loosening of scale occurring more frequently at these points than elsewhere. A rivet head, red hot and hammered, will de-

velop a very heavy scale which is not apparent at first inspection as the head is well rounded and smooth. Upon application of the descaling flame.

Heat Prover Measures Combustion Efficiency

THE Cities Service (60 Wall Tower, New York) industrial heat prover, recently developed, is said to measure the per cent of free oxygen and combustibles (unburnt or partially burnt hydrocarbons) present in exhaust gases continuously and simultaneously. This enables its user to measure combustion efficiency on any industrial furnace, boiler or internal combustion engine. Besides

showing combustion efficiency as determined from the amount of oxygen and combustibles present in stack gases, the instrument is also said to be of extreme value in the various types of metallurgical furnaces processing metals.

The furnace atmosphere, whether it be oxidizing or non-oxidizing, can be checked, set and controlled in a very short time due to the ability of the in-

strument to record such furnace atmosphere continually and indicate any change within less than thirty seconds.

The user is thus said to be able to set his combustion equipment at the highest possible operating efficiency and at the same time indicating an oxidizing or non-oxidizing atmosphere instantaneously and continuously. Oxygen readings are from 0 to 10 per cent; combustibles readings are from 0 to 4 per cent.

Recent Advances in Finishing Equipment

EMPHASIS is being placed on automaticity in the polishing of metal products, as exemplified by the machine for polishing stainless steel sheets and the two station type machines for buffing round objects. Even the application of the polishing compound to the wheel is being put on an automatic basis. Other equipment included in this review of recent announcements of the makers include

new types of plating apparatus, automatic spray guns and machines and the new carbon filament lamps for quick baking of enamels by infra-red rays. The large number of new metal finishing materials described point to the rapid increase in custom-made finishes for specific applications and the need for an orderly appraisal of the hundreds of finishes now available for the manufacturer.

• • •

INEXPERIENCED labor in any factory that fabricates stainless steel sheets in reasonable quantity can be used to operate the simplified type 27-H stainless steel sheet polishing machine recently developed by *Excelsior Tool & Machine Co.*, East St. Louis, Ill. The maker estimates that the cost of the installation will pay for itself by finishing approximately 2500 20-gage sheets, 36 in. wide x 10 ft. long, to a No. 4 finish at the present mill extra charge for this finish.

Endless paper abrasive belts, 16 ft.

long and up to 50 in. wide, are used for polishing, and gravity pressure on the rubber covered contact roll may be varied from 300 to 500 lb. by changing weights on a weigh beam. For a No. 4 finish, belts of 100, 120 or 150 grit are used, but belts up to 400 grit can be obtained for finer finishes. These belts can be changed in about 5 min., it is said. Polishing belt is driven at 3500 ft. per min. by a 30-hp. motor.

A separate 2-hp. motor is used to reciprocate the table at an average speed of 58 ft. per min. Table holds

sheets up to 48 in. wide by 12 ft. long. The clamping device is positive and the sheets cannot slip from the holding fixture. Table travel can be varied to suit the length of work. All operations are mechanically controlled and adjusted in one location by the operator.

Automatic Polishing Machines

COMPLETE enclosure of all moving parts beneath the work table and out of the way of dust and dirt is featured in the *Packer-Matic No. 4*, an improved type of automatic polishing and buffing machine for round objects, recently introduced by the *Packer Machine Co.* of Meriden, Conn. In the pedestal of this five-station machine is housed the motor drive variable speed unit, the oil reservoir for the lubrication system and all the electrical push button controls for centralized operation. Speed of the work table can be varied in a 3-to-1 ratio. Maximum diameter of work to be polished has been increased 8 to 12 in.

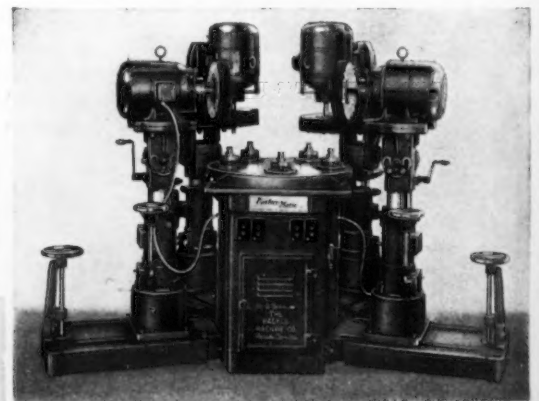
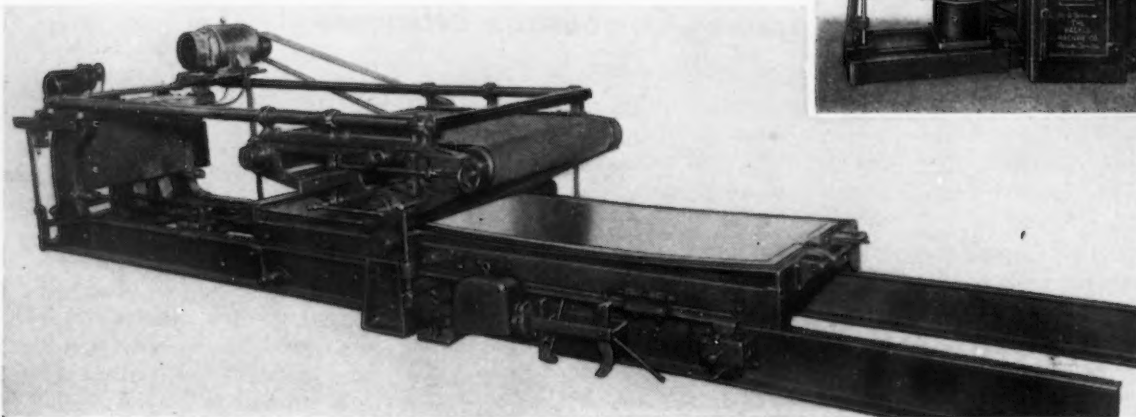
AT RIGHT

PACKER-MATIC No. 4 is a new five-station buffing and polishing machine for round work, supplied with one to four independent polishing heads.

• • •

BELOW

EXCELSIOR'S new No. 27-H stainless steel sheet polishing machine is an endless belt type capable of finishing four to six sheets per hr. in four to 10 passes, depending upon the grade of finish desired.



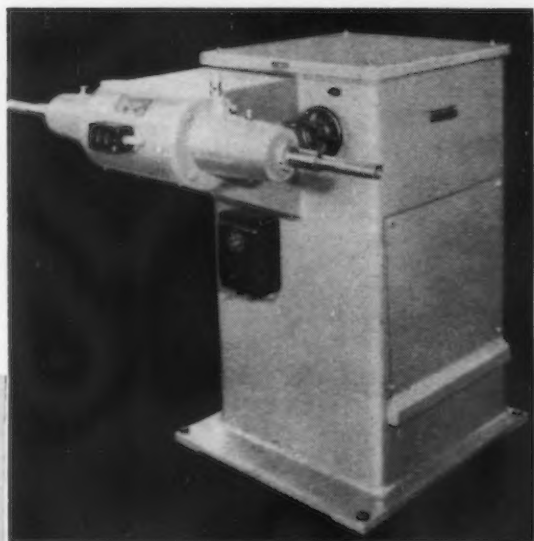
and Metal Finishes

By FRANK J. OLIVER
Associate Editor, *The Iron Age*

Wheel stands are individual units and any number up to four can be provided, of two types: wheels mounted directly on the motor spindles; or wheels carried on ball bearing spindles driven by V-belt from the motor, permitting changing of speeds of the wheels by variations in pulley diameters. The Packer composition applicator for automatically applying composition can be supplied for this type of machine.

A SIMILAR device, known as an Auto-Doper, is also fitted in the new eight-station automatic polishing and buffing machine recently exhibited by *Hammond Machinery Builders, Inc.*, Kalamazoo, Mich. This automatic composition applicator can also be adapted to semi-automatic machines and polishing lathes of other makes. The machine proper is designed to handle rounds up to 6 $\frac{3}{8}$ in. diameter held by mechanical fixtures or flats up to 3 x 6 in. held by magnetic chucks. Work spindles are driven by chain and sprockets from a ball bearing worm reducing unit. The spindles stop revolving in the loading position. Table

THROUGH a variable speed V-belt drive, controllable through the handwheel at the right, spindle speeds ranging from 870 to 3050 r.p.m. can be obtained, making this speed lathe suitable for scratch brushing, buffing and polishing operations. Spindle has a 14-in. overhang to give the operators freedom in handling bulky work. Base is of welded steel, with weight distributed for proper balance. A 5-hp. motor is standard. A product of the Crown Rheostat & Supply Co., 1908 W. Maypole Avenue, Chicago.



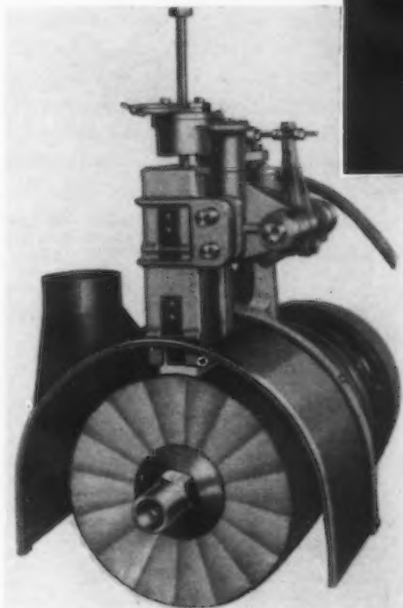
is driven by V-belt and vari-pitch sheaves from a $\frac{1}{2}$ -hp. motor.

Chemically Treated Buffs

CHEMICAL treatment is being used by the *Hanson-VanWinkle-Munning Co.*, Matawan, N. J., to make polishing buffs last longer and stand up better against abrasive wear. These buffs are made in two types of square count cloth called Economy and Tractor. The wear resistance developed by chemical treatment following weaving is further increased by the carefully balanced construction of the buffing textile. The chemical includes a hygroscopic element that absorbs moisture from the air, giving a conditioned sheeting at all times, it is claimed. It is stated also that the treated buffs absorb polishing composition better, giving improved cutting and coloring action on the product.

Portable Sanders

TWO-SPEED sanders for both 7 and 9-in. disks and in standard and heavy duty models have been introduced by the *Chicago Pneumatic Tool Co.*, 6 East 44th Street, New York. The heavy duty model is heavier powered for continuous production service under the most severe conditions. In the switch handle there is one button for each speed, and corresponding sets of gears are always in



ABOVE

THE new Hammond Auto-Doper applies composition automatically to buffing wheels. It is operated by compressed air through a three-way valve timed to the conveyor of the buffing machine or by an electric timing device or foot operated valve in the case of semi-automatic machines or polishing lathes. The unit shown will handle composition bars from 2-in. square up to 2 x 6 in. A similar unit is arranged to rotate 2-in. bars after each operation preventing a narrow wheel from cutting a groove in the bar, causing waste. Better finish is claimed because of a more uniform and regular application of composition.

AT LEFT

THE Hammond automatic polisher is an eight-station machine capable of finishing work 6 $\frac{3}{8}$ in. diameter.



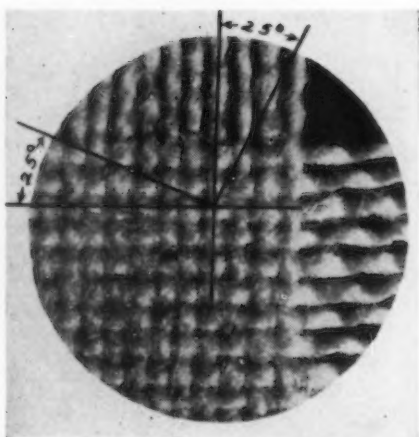


PHOTO micrograph (25x) of Hanson-Van Winkle-Munning's Tractor buff material, chemically treated to stand abrasive wear better. As can be seen, there is a twist in the horizontal threads of approximately 25 deg.



THE Chicago-Pneumatic two-speed sanders come in 7 and 9-in. disk sizes. A single-speed model of similar design is also a new development.

mesh since shifting takes place electrically as the motor starts. Semi-enclosed fan-cooled, high torque motors are used. Right angle drive is effected through spiral bevel gearing and all shafts are mounted on ball bearings, properly enclosed.

Speeds under load for the standard model are 2400 and 1500 r.p.m.; for the heavy duty model, 2600 and 1600 r.p.m. Single speed types in both models are also supplied.

ANNOUNCEMENT is made by the *United States Electrical Tool Co.*, Cincinnati, of a new three-in-one flexible rubber sanding pad. One side of this solid molded rubber pad is flat for sanding flat surfaces and the other side has a curved surface for feather edging and sanding curved surfaces. One pad holder nut fits 5, 7 and 9-in. pads. Among the claims for this pad are better balance, longer life, greater flexibility, light weight and safety, since it is non-breakable.

Drying of Enamels by Radiant Heat

ILLUSTRATED is one of the new Dritherm infra-red ray lamps for drying enamels by radiant heat, a proc-

ess covered by Patent No. 1,998,615, assigned to the Ford Motor Co. In the original studies covered by the patent, it was found that infra-red rays in the range of 10,000 to 16,000 Angstrom units (1 to 1.6 microns wavelength) as produced by a carbon filament lamp at 3400 deg. F. were capable of being absorbed much more completely by an enamel film than the longer heat waves from an open resistance wire heater. While absorption is high on the surface, transmission of infra-red rays beyond the first millimeter of thickness is slight so that practically no heat reaches the base metal such as does occur when tungsten filament lamps (5000 deg. F. source) are used, which have a high transmission factor and low absorption.

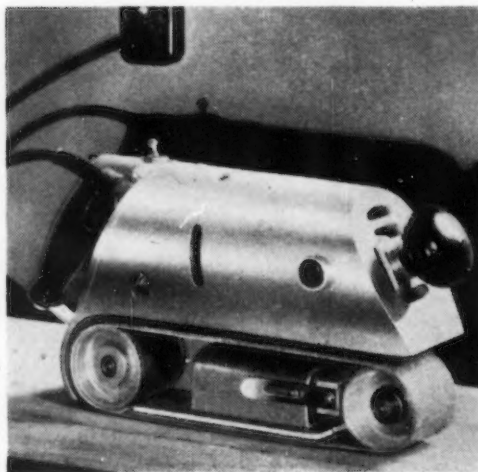
With the carbon filament lamp, baking can be completed in less than 5 min., and at a considerably lower temperature than heretofore required when baking at 300 deg. F. for several hours was the practice, using open resistance heating elements. The process is particularly valuable in auto

body touch-up work, which can be carried on after the glass and trim is in place.

Metal Cleaning Drum

AN improved continuous drum type metal cleaning machine has recently been introduced by *M. Ransohoff, Inc.*, 204 West 71st Street, Cincinnati. Drum is 24 in. in diameter and 75 in. long. The first 16 in. is for a soaking wash and has a patented lock washer and dam construction on the discharge end so as to maintain the level of cleaning compound and pass the work without dropping. Balance of the drum is perforated and consists of 10 in. spray wash and 49 in. drain.

Cleaning compound for both the soaking and spray wash is handled by a centrifugal pump delivering 40 g.p.m. at 60-ft. head and driven by a 1-hp. motor. Wash water tank is heated by steam escaping from a perforated pipe. Machine is equipped with overflow skimming dam, chip pan and chip basket readily removable for cleaning. Steel bands are welded to

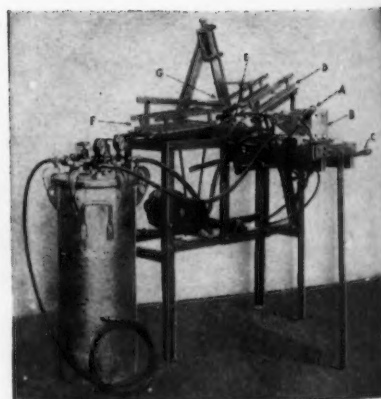


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THIS belt type of sander for finishing flat or slightly curved wood and metal surfaces, known as the type A-2 GuildSander, has a die cast aluminum frame and weighs only 9 lb. Made by the Syracuse GuildTool Co., Syracuse, N. Y., it employs a 2-in. wide abrasive belt driven by a 110-volt universal motor at 600 ft. per min. Belts are 21 in. in circumference and can be furnished in all usable grits. They may be changed instantly by means of a catch-and-release spring plate. Front pulley may be used as a spindle sander.

AT RIGHT

SEMI-AUTOMATIC spray coating of the inside of small cylindrical objects such as paper or metal cans is performed on this machine, recently developed by the Eclipse Air Brush Co., Inc., 390 Park Avenue, Newark, N. J. Cans fed by gravity down a slide are released by a hand lever onto a rotating device driven by a 1/6-hp. motor. A solenoid operated spray gun with extension nozzle is then moved forward to coat the inside while the cylinder is rotated. The gun is pulled back and the next cylinder comes down, pushing the finished one on its way. Production of 10,000 pieces per 8 hr. is claimed.



the drum for the running tracks and bear on chilled trunnion rollers.

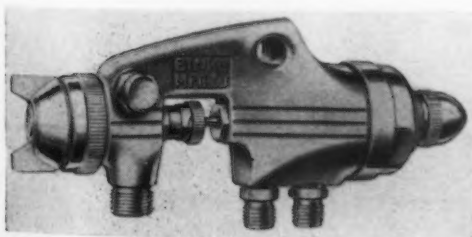
Primer for Rubber Coatings

APLICATION of rubber coatings to acid tank linings and the like has advanced considerably in the last two years. For this work, *Self-Vulcanizing Rubber Co.*, 605 W. Washington Boulevard, Chicago, has developed a single coat, liquid rubber primer coating material that dries cold to a solid surface within an hour and withstands temperatures up to 212 deg. F. Selfvulc M-A primer is the first coat upon which the liquid rubber, such as the company's Airvulc, is applied for tank lining work. It covers 250 sq. ft. of surface per gal.

Primers for Rusty Surfaces

VALDURA No-Rust primer is a clear liquid of tung oil base for application directly on rusty surfaces without prior cleaning. The material surrounds each rust particle and prevents further oxidation or bleeding through the top coat. Test applications of asphalt and asphalt aluminum paints over this primer on rusted tin, galvanized iron and pitted steel plate have all stood up over a period of years, according to the maker, the *American Asphalt Paint Co.*, Chicago. It is believed, however, that any top grade paint can be successfully applied over this primer.

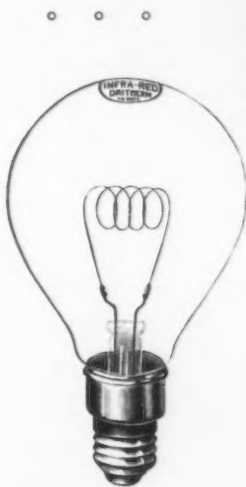
ANOTHER approach to the problem of painting rusted surfaces is the application of chemical to neutralize the rust. This is the principle involved in Corrosol No. 2 metal conditioner, made by *International Rust-proof Corp.*, 12507 Plover Avenue, Cleveland. This product is an orthophosphoric acid and alcohol solution reinforced with reduced chromates.



THOR model No. 21 automatic spray gun is a pneumatically actuated type with an improved three-way valve for cam, hand or foot operation of the air plunger which operates the trigger of the gun. The positive action of the air plunger is said to give spraying results equal to hand operated guns. Dripping and spitting have been eliminated. This product of the Binks-Mfg. Co., 3114 Carroll Avenue, Chicago, is available in set-ups for handling lacquer, synthetic enamels and ceramic or vitreous materials.

AT RIGHT

A SOAKING wash, followed by a spray wash under pressure and finally a drain in a perforated drum comprise the three elements of this Ransohoff metal cleaning machine. The worm in the drum is welded in place to prevent sticking of small parts.

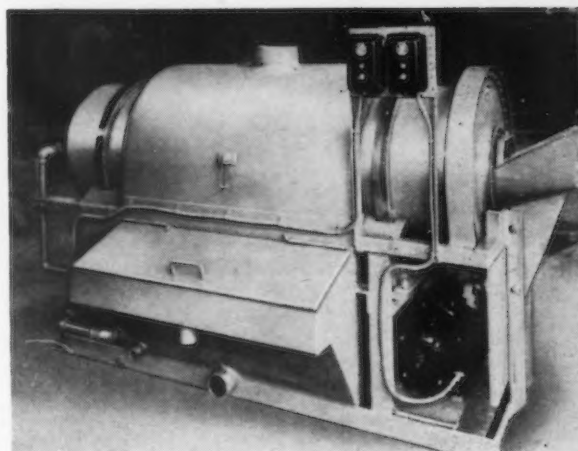


DRITHERM is the trade name of the newly improved Nalco infra-red lamps manufactured by the North American Electric Lamp Co., 1014 Tyler Street, St. Louis, for radiant drying and heating purposes. Long burning life in proportion to high efficiencies obtained, uniformity of filament materials as well as the proper placement of the carbon filament within the bulb, and rugged construction to minimize breakage are some of the features claimed for these lamps. They are especially useful for short-cycle drying of enamels as explained in the text.



ABOVE

THE Sprayit STR spray gun and cup can be converted from bleeder to non-bleeder type instantly and hence may be used on air lines as well as with portable air compressors for general maintenance painting. It is regularly supplied either as a pressure feed gun with internal mix spray nozzles or as a syphon feed gun with external break-up nozzles. Gun body and cover are of die cast aluminum and the 1-qt. container is also aluminum. A filter in the handle removes oil and moisture from the air. Nozzles and fluid tips are case hardened steel to reduce wear. Made by the Electric Sprayit Co., Inc., 220 N. Broadway, Milwaukee.



It converts the iron oxides into iron phosphate and also leaves a deposit of ferrous chromates. Furthermore, the water of crystallization is absorbed by the alcohol and expelled by evaporation. The iron phosphate is light gray in color and is dusted off the surface when dry. When applied to new steel, the Corrosol is rubbed off with a dry cloth within a few minutes after application before it starts to become tacky.

Zinc Surface Conditioner

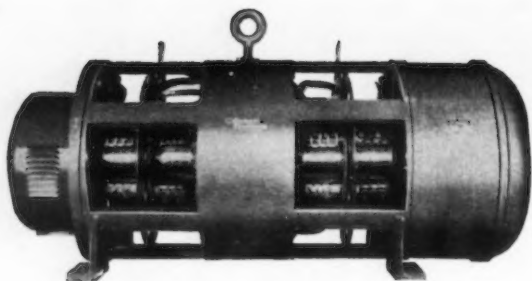
ANEW method of treating zinc or zinc-coated products before finishing them with lacquer, enamel, paint or varnish has been developed by *Maas & Waldstein Co.*, Newark, N. J. The product is dipped in or wiped with a solution of a compound called Zinsol, causing the formation of an alloy of zinc and another metal on the surface. This alloy is said to be inert to moisture, the atmosphere and organic finishes generally so that it forms a stable foundation for the finish. Otherwise, the oxidation products of zinc combine chemically with the constituents of most finishes, eventually destroying them.

Transparent Coating for Metals

SEAL-COTE is the name given a new transparent protective coating for ferrous and non-ferrous metals said to withstand the action of sunlight, moisture and general climatic changes. Made by the *Fales Chemical Co.*, 545 Fifth Avenue, New York, it may be sprayed or brushed on by a simple technique.

Enamels and Paints

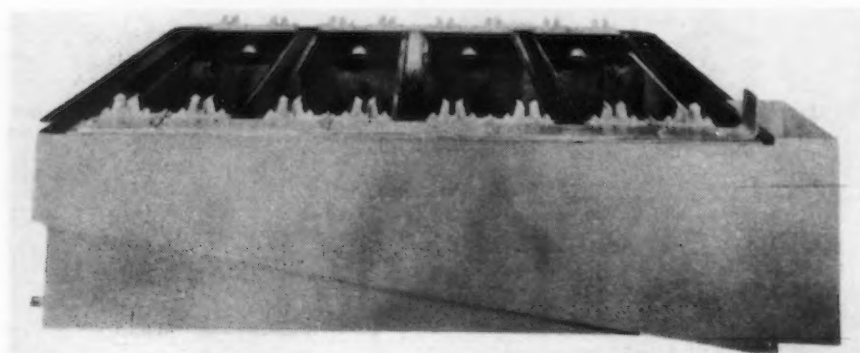
ANOTHER new product of *Maas & Waldstein Co.* is a line of synthetic enamels with very short



THIS new 3000-amp. motor generator, made by Hobart Brothers Co., Troy, Ohio, is built especially for heavy duty plating and may also be used for refinishing, rust-proofing, hard chroming of tools, electro etching and electro pickling and cleaning. High efficiency of both the Hobart motor and generator is claimed as well as liberal design to give ample capacity to handle peak loads as well as light loads economically.

baking schedule. Polydur enamels set out of dust in a few minutes. Their baking schedules depend upon the temperature employed, but at 325 deg. F. they bake to a finish without discoloration in 15 min. Supplied in white

long oil type for exterior application; a wet surface type; a quick drying type and others. For product finishing, the company makes a ready-mixed aluminum paint that will dry to touch in 15 min. on metal or wood products; a



A NEW method of exhausting the fumes is used on this plating barrel tank for hot solutions, made by the Hanson-Van Winkle-Munning Co., Matawan, N. J. A series of small ducts directly over the anode rods connect with the main duct on the side. These individual ducts do not interfere with the placement of the cylinders in their respective saddle brackets, nor do they leave any unsightly ducts along the side or above the tanks.

and all colors, this enamel is said to be very durable and resistant to marring and household chemicals.

DUOTONE is a new baking metal finish material produced by the Glidden Co., Cleveland, that gives a uniform two-tone effect in one spray application. Advantages claimed by the maker include its stability, since it is unaffected by varying oven conditions and produces a consistently uniform finish; its economy in terms of coverage; and its product appeal.

TWO series of aluminum paints, one for maintenance work, the other for product finishing, are announced by the paint division of Aluminum Industries, Inc., Cincinnati. In the former group, Permite paints include a heat-resisting type with a synthetic alkyd resinous vehicle for temperatures up to 1000 deg. F.; a

nitrocellulose spraying lacquer, and a very fast drying spraying lacquer that will dry to touch in $\frac{1}{2}$ to 2 min. and dry hard in 3 to 5 min.; a short oil synthetic grade giving a smooth and brilliant finish, and a dipping type that can be air dried or baked at 300 deg. F.

Stop-Off Lacquer

THE Michigan Chrome Co., 6340 E. Jefferson Avenue, Detroit, has developed a clear, non-pigmented stop-off lacquer for insulating plating racks. It can be applied directly to the metal after a thorough cleaning. The makers state that the lacquer has proved very effective in processes such as concentrated or dilute hydrochloric or sulphuric acid dips, cyanide or acid copper baths, standard or bright nickel baths and chromic acid baths. It is also impervious to nitric and hydrofluoric acids and has proved satisfactory for use with degreasing units.

Porcelain Enameling Clay

THE Porcelain Enamel & Mfg. Co., Baltimore, is introducing a refined type of clay for use in porcelain enameling frits. Known as Micronized clay, the material has been broken down to grain sizes ranging from 1 to 10 microns (0.001 to 0.010 mm.) by the Micronizer reduction process in which the material itself becomes the grinding medium. Among the claims for improvements due to increased fineness are: greater workability, improved suspension, greater wetability, better drainage, smoother set and a cleaner product. Pitting and scumming is reduced to a minimum.

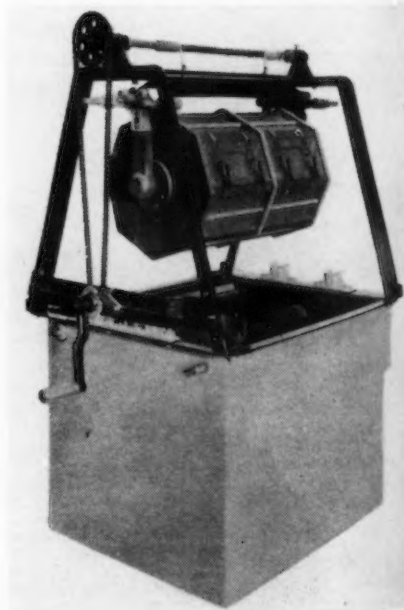
Paint Economics

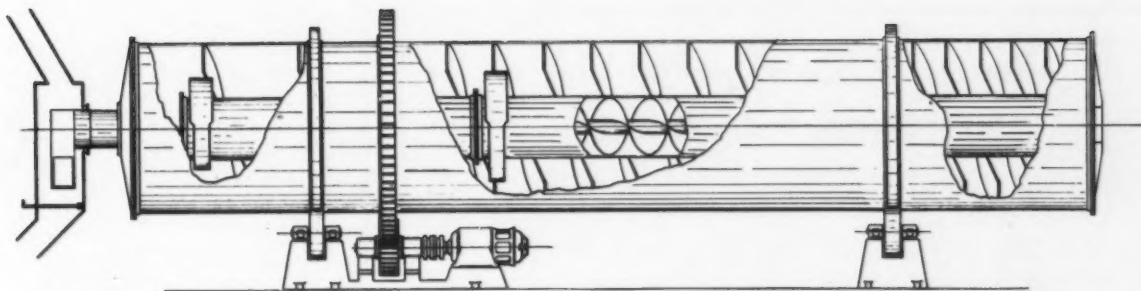
TO obtain comparative cost data on paints, particularly aluminum paints, the American Asphalt Paint Co., Chicago, has adopted a formula that takes into account the length of service and performance efficiency. To obtain this so-called annual-foot-cost, or AFC, the cost of paint per gallon is divided by the number of sq. ft. covered per gal. and the result is added to the hourly labor cost of painting

o o o

BELOW

ANOTHER improvement in plating barrel construction is the Mercil hand operated hoist for single cylinder plating barrels, made by Hanson-Van Winkle Munning Co. Hoisting of the barrel is effected through two $\frac{1}{4}$ -in. wire cables which wind about the shaft above the iron framework. This shaft is revolved by hand crank through the medium of a 3-to-1 chain and sprocket drive. Ratchet and crank handle may be placed on either side of the tank.





DIVISION of material into thirds by geometric progression in addition to mixing caused by rotation of the cylinders is the basic principle of operation of this triplex dry blender, made by the Patterson Foundry & Machine Co., E. Liverpool, Ohio. The material fed to the blender at the left enters a single helical screw flight fastened to the outer shell, traveling one-third of the way, where it enters a double helical screw flight and is divided into two streams. When the third compartment is reached, the material enters a triple helical screw flight and is divided into three streams. Each of the compartments of the outer cylinder has a scoop that picks up one-third of the material and deposits it in the inner cylinder. Again it is divided into sections traveling left toward the starting point, and one-half of this stream is returned to the outer shell. Eventual discharge may be arranged at either end.

divided by the number of sq. ft. painted per hr. The sum of these two results is then divided by the number of years of service or life of the paint to determine the annual cost per sq. ft. painted. This method of evaluating past performance is only applicable where an accurate check has been kept of painted surfaces.

Wear Tester for Surface Finishes

MODEL J portable Abraser, made by the Taber Instrument Co., North Tonawanda, N. Y., is a compact testing machine for accurately evaluating resistance to rubbing abrasion. Its range of application covers practically all painted and lacquered finishes, vitreous enamels, plastics and electroplated metals. An accelerated



THE Model J portable Taber Abraser is a new calibrated wear tester for the scientific grading of surface finishes by means of an accelerated abrasion test.

test is given by means of calibrated wheels that alternately cross-rub back and forth over a circular path approximately 2 sq. in. in area. The wear is continuous and practically at a constant rate due to coordination of the various factors involved in the test. End point of the test for coatings is when penetration of the film is first observed, or in the case of solid materials the test is continued to a depth of 0.001 to 0.005 in. Measurement of the wear depth to the nearest 0.0001 in. is taken with suitable micrometers and the wear per mil calculated. A shear test attachment gives a numerical rating for toughness of organic substances such as paint and lacquer coatings in resisting scrapes, digs and cuts.

Exports of Machine Tools to Great Britain Likely to Decline; Those to Japan, Increase

THE fundamental position in the British machine tool market changed rather drastically during 1938 as revealed by the foreign trade figures in metal-working machine tools. For a period of nearly two years the demand for machine tools had far exceeded the domestic supply in spite of increasing and intense production activity. Imports during 1937 were at a consistently high level and during the year exceeded £6,000,000. The outstanding sources of supply for these huge imports were the United States and Germany, with nearly 60 per cent coming from the United States. Exports of British machine tools were at a comparatively low level, due to the intense domestic demand. During the early part of 1938 this picture began to change as imports declined and

exports increased, so that during the latter months of 1938, exports have again reached a value substantially above imports.

The prospective demand for imported machine tools in the British market during the coming year, providing always that some element of stability is retained in the international situation, promises to remain active but cannot be expected to reach the intense activity witnessed during 1937 and the early part of 1938, according to the American commercial attaché at London. In fact, a further substantial, though gradual decline in imports of machine tools would seem to be the most likely forecast to anticipate.

According to the Japanese press, on the other hand, it is expected that

metal-working imports into Japan will be greater during 1939 than in the record year 1938 when the total was estimated to be over 200,000,000 yen (\$56,000,000). The situation in China and on the Soviet front gives rise to the belief that conditions will require an even greater importation of these very necessary machines for expanding armament industries. The United States has been supplying 70 to 80 per cent of the imported machine tools, with Germany and the United Kingdom supplying the remainder. The Japanese doubt that any embargo will be put on machine tool shipments to their country from the United Kingdom or the United States inasmuch as these shipments play such an important role in the two countries' export trade with Japan.

Results of Iron Age Poll On Steel Basing Point System

UP to the time of going to press 304 votes had been received from steel buyers on the question shown in an adjoining column. On Question No. 1, there were 268 "yes" votes and 22 "no" votes. On Question No. 2 there were 37 "yes" votes and 233 "no" votes.

The difference in the number of votes on the two questions is due to the fact that some voted only on one question.

Geographically, the votes were recorded as follows:

Alabama	3	Maine	1	Oklahoma	2
California	6	Maryland	2	Pennsylvania	43
Colorado	1	Massachusetts	18	Rhode Island	3
Connecticut	12	Michigan	31	Texas	3
Florida	2	Minnesota	3	Vermont	1
Georgia	2	Missouri	9	Virginia	2
Illinois	17	Nebraska	3	Washington	1
Indiana	10	New Jersey	13	West Virginia	4
Iowa	4	New York	25	Wisconsin	15
Kansas	4	North Carolina	1	Scattered	8
Kentucky	4	Ohio	51		

The results of this poll seem to point conclusively to widespread opposition among steel buyers to any change in the steel basing point system which would deprive steel sellers of the right to equalize freight rates, a method of selling which a majority of buyers declare gives them the opportunity to buy from a number of different sources at no difference in delivered cost.

If further returns are received, they will be tabulated in subsequent issues.

THAT the steel buyers of the country are overwhelmingly opposed to the Federal Trade Commission's plan of steel pricing as proposed in its recent memorandum to the Temporary National Economic Committee is indicated by a survey made by THE IRON AGE, results of which are shown in the above box.

(The complete report of the Federal Trade Commission was published in THE IRON AGE of March 16, page 49.)

In order to test the opinion of steel consumers and distributors on the Federal Trade Commission's proposal, THE IRON AGE has taken a sampling poll by mail. Two questions were asked:

1. Do you feel that your ability to buy steel from a number of different sources at no difference in the delivered cost to you is an advantage in the economical operation of your business?

2. Do you agree with the contention of the Federal Trade Commission that the abolition of freight rate equalization on steel shipments would be a good thing for the steel consuming industry?

These questions were sent to 1000 buyers of steel. The names were selected at random from directories, but care was taken that all sections of the metal-working industry covering a wide variety of products should be represented and that the names should include large, medium and small companies. The geographical distribution was such as to include all states.

Opportunity was given to vote anonymously, but a great many voted without concealment of their names, and some took the occasion to send in comments, some of which criticised the Federal Trade Commission's plan severely as lacking in "plain common sense," as "silly," and as likely to

Steel Buyers

By C. E. WRIGHT

Managing Editor, The Iron Age

bring "disaster to some units." The present system was described as "the most equitable" for all buyers. Some sentiment was expressed by steel buyers that every mill should be a basing point for the products it makes, but the opinion seems to be almost unanimous that the abolition of freight rate equalization would deprive buyers of the opportunity which now exists to buy from any one or more of a number of different sources of supply without difference in cost.

Only in the structural steel fabricating industry is there a serious complaint against the present system, and that complaint is not primarily a result of the basing point system but arises partly from the fact that fabrication-in-transit rates frequently operate disadvantageously for some localities.

Comments of Steel Users on FTC Pricing Plan

A Manufacturer of Machine Parts

Our company is a very substantial consumer of cold drawn bar steel and we are located away from any basing point. We have occasion to purchase steel from several different producers located in different sections of the country, and there are several good reasons why we do so, viz., we find that one producer may have one type or grade of product which is preferred for one reason or another as compared with any other producer of this same product, whereas another type or grade of another producer may be found advantageous for us to use.

Our company manufactures a specialty line of machine parts to

ers Overwhelmingly Opposed to FTC Plan of Steel Pricing

order on which it is, of course, necessary for us to predetermine our exact delivered cost of raw material. When it comes to placing our raw material orders, the matter of delivery from the steel mill may be vitally important to us; and this being the case, we are, under the present practice of basing point sales, able to purchase our requirements from any one of many sources on exactly the same delivered price cost, thereby enabling ourselves to place our business where we can obtain the best delivery, which oftentimes is vitally essential, and without having to pay any increased price due to difference in freight rates from different mills. This difference in freight costs might easily represent a loss of \$3.00 or more per ton were it necessary for us to purchase from a distant mill in order to secure the delivery required.

The adoption of f.o.b. mill practice of selling would, we believe, result in a very chaotic condition both to the producer and consumer.

There are so many objectionable features to such a change in practice, which would very seriously affect both producer and consumer, that we would consider it ridiculous on the part of the Federal Trade Commission to give any very serious consideration to such a change.

The f.o.b. practice would be very advantageous to large producers with producing mills scattered around the country and it would certainly inflict a terrible hardship on the small independent producer. It is difficult to see just how the small independent producer could survive if it became necessary to sell f.o.b. mill without freight equalization, and we are very definitely interested in their future inasmuch as we find them to be en-

tirely satisfactory sources, especially so from a service standpoint.

We would prefer not to write anonymously on this subject, but at the present moment we have reasons for so doing. But we do desire to again emphasize the point that we are a very substantial consumer of steel.

An Ohio Machinery Builder

We are interested in this subject and have from time to time given the question of pricing careful consideration. We think we can see many reasons for and against the present system of pricing, but we are quite certain it would be a mistake to make any more arbitrary changes affecting industrial operation at the present time.

It seems to us that the deplorable condition of employment, finance, and business in general is largely due to the fact that so many changes have been made by the New Deal Government during the last few years. If we are ever to get back to a normal and sound condition we will have to stop making changes and place more reliance upon the play of natural influences.

A Missouri Manufacturer

We have of course been familiar with the attempts which have been made toward prohibiting the equalization of freight rates on steel, and, while we have tried to see advantages which might result from a definite f.o.b. mill price basing system, we cannot see any advantages that would arise out of such a system and we believe the present method is best.

A New England Tool Manufacturer

If the basing point system is abolished, it might mean disaster to some units.

A Western Pennsylvania Spring and Axle Manufacturer

The mills in our district do not furnish all the products nor the prompt service we need.

A Central New York Steel Jobber

Would like to see the old Pittsburgh Plus restored.

Purchasing Agent of a Large New Jersey Manufacturer of Automobile Parts

The present set-up to me is most equitable because if otherwise it would mean that freight would be charged from actual point of shipment rather than from centralized point which is going to considerably penalize the users. I can see no advantages whatsoever in making the change but rather to the contrary. And when I say that, I am speaking of industry as a whole or users of steel. Considerable of our wants are purchased in Ohio, therefore if basing point other than now in existence would apply, you can readily calculate as to how we would be penalized.

A New York State Manufacturer of Factory Equipment

We feel the Federal Trade Commission plan on this is not at all practical; in fact in our opinion it lacks plain common sense.

President of a Rhode Island Bolt and Nut Manufacturer

We have been buyers of steel for a good many years and it would be nothing short of a tragedy to return to the old system of f.o.b. mill. Being manufacturers of bolts and nuts, a good many of our products are also sold on the same basing system as our sources of supply of steel, and we

(CONTINUED ON PAGE 97)

Gray Irons vs. Gray Iron

(CONCLUDED FROM PAGE 23)

able are chiefly for tensile test bars cut from larger sections. In the effort to make the test bar include something more than just the center, it is customary to use tensile bars the diameter of which increases with the section of the casting to be studied. The necessity for matching the test bar section to the casting section it is to represent is universally recognized.

The obvious lesson from the available data on size sensitivity is that to secure high strength in large sections, high test or even alloy irons must be used, for not only are they stronger in small sizes, but, as a class, they lose less strength as the section increases.

The study of section size makes clear that while the engineer may look to tables and families of curves for general trends, without specific tests on the particular iron he is using, melted and finished in the particular way employed and cast into corresponding section, he does not have complete assurance of the actual properties. The irons of individuality, whose property curves cut across the "average" curves, may be decidedly better or decidedly worse for a given purpose. Testing and selection of those that are decidedly better offers a real opportunity for better materials of construction among the large family of gray irons.

Graduations in Properties

It should occasion no surprise that gray irons show general gradations in engineering properties, as section size, carbon and silicon are varied, since both the size and distribution of the graphite flakes and the properties of the supporting matrix are altered thereby. But beside these variables, manganese, sulphur, phosphorus, probably even the tiny amounts of oxygen and hydrogen, all of which are present in all gray irons, all play an alloying role, affecting the matrix and the graphite distribution. Beyond that, additions of intentional alloying elements such as nickel or copper with their matrix strengthening and graphitizing effects, molybdenum with its dual role, and chromium, vanadium and titanium, with their marked effects on carbides offer a possibility of still wider gradations. The mode of melting, the temperature of melting and the amount and order in which graphitizing agents are added to "finish" the melt, as well

as the means of removal of unwanted sulphur in the ladle, are other features which allow the foundryman to run the gamut and produce overtones of subtle differences in irons of similar chemical composition. The photomicrographs shown in Fig. 2, illustrate the differences in structure of a typical Class 20 iron and a typical Class 40 iron.

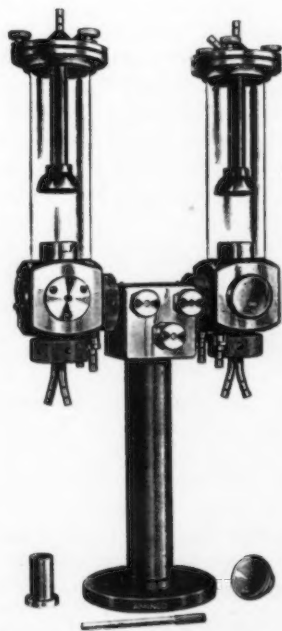
Full understanding and utilization of these factors will ultimately allow production of "tailor-made" gray irons to a degree similar to that of special alloy steels, and with greater flexibility because the gray irons may be prepared in small special lots with greater ease than is the case in the steel mill with a huge open-hearth heat. Some captive foundries, notably in the automotive industry, and a few jobbing foundries specializing in such fields have made decided progress toward tailor-made irons. When the users of gray iron in general realize the potentialities in irons tailor-made to their specific needs, a wide demand will open up which will make gray irons occupy a far more important position among engineering materials than "cast iron" has ever held.

But before the fine gradations can be worked out to meet specific needs, the real engineering requirements of those needs must be given thought by the user, so he will know what to ask for. The foundryman should himself pay more attention to the differences in properties of the various irons he produces so as to know what combinations are readily available and what the advantages and drawbacks are to the product resulting from a given composition and technique. To order so many pounds of gray iron without careful consultation between the user and the foundryman, as if gray iron were a single material instead of taking advantage of its infinite gradations, is like going to the drug store for Epsom Salts, no matter what ails you, instead of having a careful diagnosis made in which the patient's symptoms and condition are clinically determined, and a prescription given which best fits the case in the light of modern knowledge and experience.

This discussion does not bring out the increased difficulty of casting the super high-test irons. Up to 40,000 or 45,000 tensile strengths, relatively little difference is met in foundry behavior. These irons present more

difficulties than the weaker irons, but the difficulties are fairly readily overcome. When it becomes necessary to step beyond the 45,000 mark special furnaces are desirable to give full control of composition and to reach the necessary temperature. Vigilance is needed in operating the cupola and in making the final additions, and to get uniformly high properties recourse to alloying additions is usually had in order to make up beforehand for the effects of a slip in vigilance. The alloys add to the cost. Moreover, the super high-test irons have greater shrinkage, are less easy to cast sound, and have the disadvantage of their higher melting points and consequently reduced castability.

The user should realize that there is, from a combination of causes, a rather marked increase in the cost of production of the super high-test irons. The designers and foundry experts should be called into especially serious conference to determine whether a super high-test iron ought to be specified. It will often be justified, but it is not to be secured without relatively more expensive effort in the foundry than that expended in going from Class 20 to Class 40.



OF interest to the research worker is the new Aminco ion type single or double X-ray tube for diffraction and crystal structure study, metallurgy and chemical X-ray analysis. Made with stainless steel bodies and pyrex glass cylinders, it is a product of the American Instrument Co., Silver Spring, Md. Each tube is provided with three windows. A new powder spectrum camera is also available for use with the tube.

THIS WEEK

ON THE

By W. F. SHERMAN
Detroit Editor

ASSEMBLY LINE

... Packard president resigns to head board and plan expansion program . . . Auto dealers adopt cautious attitude regarding second quarter prospects . . . Die shops experience upturn and first parts orders are placed for 1940 models . . . Ford reported experimenting with plastic body shell.

DETROIT—The most significant change in personnel in recent years in the automobile industry occurred this week when Alvan Macauley, president of Packard Motor Car Co. since 1916, vacated his office, becoming chairman of the board of the company on Monday after M. M. Gilman, vice-president and general manager, was elected to the board and became president.

In his announcement of the change, Mr. Macauley said that he was freeing himself from responsibilities of operating management to concentrate on a long range expansion program for Packard. It is explained that the company will continue its program of building cars for an ever-widening market. This indicates that Packard will eventually go through with its plans for introducing a light car competitive with the Big Three.

Under Alvan Macauley's leadership, Packard has shown an increase in net worth from \$17,000,000 to \$42,000,000 in 23 years. Mr. Macauley is one of Packard's largest stockholders. He first joined the company in 1910 as general manager after being associated with National Cash Register Co. and Burroughs Adding Machine Co. He has served the company as president longer than any other automotive company executive in the history of the industry. Since 1929 he has been president of the Automobile Manufacturers Association.

Gilman 20 Years With Packard

Mr. Gilman, a pilot in the World War, joined Packard as a salesman

20 years ago. He became vice-president and general manager in 1934, and since then has had active association with all phases of Packard engineering, manufacturing and distribution. When his nomination as president was announced, he said:

"Many current factors justify the expansion activity in which we are now engaged. The company's cash position is excellent. (Editorial Note: Despite losses of \$1,638,317 in 1938, the company is expected to show

profits of approximately \$1,875,000 for the six months ended April 1, 1939.) An active program of plant rearrangement to increase production efficiency is nearing completion."

May Mean a Light Car

Speculation links these executive changes with the light car design which Mr. Macauley has fostered for several years. As reported weeks ago in the Assembly Line, Packard's sudden cancellation of outside tool and die work on these plans did not signify any intention of killing the plans permanently. Engineering work is still being done on the proposed light Six. The delay is attributed to the fact that Packard is interested in reentering the aircraft engine field, which seems to be of more pressing importance than the light car field. Undoubtedly, Mr. Macauley, taking advantage of his newly acquired opportunity to concen-



ALVAN MACAULEY, president of Packard Motor Car Co. since 1916, has become chairman and M. M. Gilman, vice-president, becomes president. Changes may signify expansion program for Packard.

trate on a long range expansion program, still has the light Six in mind. Observers wonder whether Packard, with its proud name and long history, may be girding for a fight to build this independent company's volume and coverage up to the level of some of the corporate groups.

Output at Steady Level

The automobile industry continues its moderated tone, with production holding close to the level of recent weeks. Output during the last week is reported at 88,050 units, compared with 87,019 the previous week and 58,521 a year ago, according to Ward's Automotive Reports. Ford-Mercury production continues for the fourth week at a level of 21,750. Lincoln-Zephyr output for the third successive week is 480. Chevrolet output rose 1000 units, to 21,500 and Plymouth gained 200 to 9700. There were minor revisions downward among some of the other companies.

The solemn note regarding second quarter automotive prospects struck in this column weeks ago is followed by a statement on the part of the National Automobile Dealers Association that

"While the publicity departments of automobile makers are describing sales of motor cars as unusually promising, operating executives do not appear to be so sure about what is actually going to happen," and repeats the figures of the Purchasing Agents Association of Detroit which show that Detroit industrial buyers have been very cautious since the first of the year. (See previous Assembly Lines). NADA urges dealers to use caution in buying cars from manufacturers, expressing the opinion that dealers' stocks, which have been rising steadily, are at a peak.

The NADA completes its 22nd annual convention today in San Francisco. The convention was staged as a clinic with the theme, "What's Wrong With the Automobile Business and What Can Be Done About It?" Charging that dealers in 1938 earned less than one-quarter of a cent per dollar of sales on a group volume exceeding \$50,000,000, the organization discussed factory practices which were considered responsible for price cutting, wild trading, finance pacts, overloading of dealers with autos and sales problems. The only speaker repre-

sending a manufacturer at any of the sessions was William E. Holler, general sales manager of Chevrolet, famous for his "quality dealer" program.

A Steady Output Expected

With the evidence that automobile retail sales really are far ahead of 1938, there is no reason to believe that the industry is beginning to slump. But the manufacturing plants are preparing for a foreshortened season in most cases and the spring peak, even if it has not already been reached, has at least been approached. There is reason to believe that April, May and June each will see good volumes of sales reported, with production from now on geared to the sales pace.

Die shops have experienced an upturn in business as a result of automotive releases—and also because of increased volume of work allied to munitions making. In general, it is reported that Chrysler programs are among the most active, with certain of the General Motors units next in line. Buick, for instance, is pressing for early completion of its program which was initiated late in January. Most of the changes for this car are concentrated on the front end which will have voluminous fenders nearly eliminating the conventional radiator central grille and the hood nose stamping. However, Chevrolet work is still looked for, and one authoritative source said that fenders and sheet metal, which includes aprons, etc., have not been completely designed yet. Also it is rumored that this particular car may be delayed in its announcement, with next January hinted as a probable date. Offsetting such statements, is the fact that suppliers are being urged to finish production samples of parts as soon as possible for Chevrolet engineering examination. Orders for stampings, forgings and other parts are being released as rapidly as samples are approved. No shipping dates have been set, however, and no quantities specified. These are among the first parts orders placed for 1940 model cars.

There is little evidence yet to indicate the extent and nature of the Ford program for next year. But there is an even chance that dry cylinder liners of light-gage, heat-treated steel, deep drawn from a material similar to fender stock, will be quite general in the Ford line of engines. First clue that this would be Ford practice was the mention made in the Assembly Line last fall. At that time Ford incorporated dry liners in truck engines. Now additional equipment is being installed in the Rouge Plant to process

THE BULL OF THE WOODS

BY J. R. WILLIAMS



THE ATHLETIC AGE

the parts and heat treat them. Indicated volume is enough to supply all the Ford line. The purpose of these liners is to provide a hardened steel bore rather than cast iron and to make possible easy reconditioning of engines after they have seen hard service.

Plastic Car Bodies?

Body experts the world over will watch the Ford exhibit at the New York World Fair to see whether the company actually will exhibit a plastic molded body, made in two halves. Unbelievable as it sounds, it is said that Ford recently molded half of a Lincoln-Zephyr body from a plastic material in secrecy. It will be recalled that the forerunner of the present Lincoln-Zephyr body with integral frame was exhibited for the first time at the Chicago World's Fair. Who knows? The new German "Volkswagen" (People's Car) is known to have a body constructed almost entirely of plastic materials.

Everyone who has visited an automobile plant marvels at the fact that cars come off the end of the assembly line with the proper colored body to match fenders, wheels and sheet metal, even though the industry long ago abandoned the practice of making cars in "batches" of blacks, reds or greens as the occasion demanded. Visitors wonder what would happen if the scheduling system broke down some time. Well, Plymouth officials finally have admitted that it did happen once—but only once in the last 11 years. On this occasion a wrong-colored chassis arrived at the "body-drop," or the wrong colored body, nobody will say which. That time the crane operator swung over the line with a body of brilliant blue when the sheet metal and fenders on the car below were bottle green. What happened? Everybody stopped work and cheered!

Railroads Spent \$152,176,000 For Steel Last Year

THE Association of American Railroads estimates that carriers during 1938 spent \$152,176,000 on iron and steel products as compared with \$359,409,000 in 1937. For locomotives and car castings, beams, couplers, frames and car roofs, the railroads spent \$22,221,000 in 1938 compared with \$62,373,000 in the preceding year. Purchases of steel rail, including new and second-hand except scrap, amounted to \$23,742,000 in 1938 against \$44,424,000 in the preceding year, while for track fastenings, track bolts, spikes and other materials, used in connection with the laying of rails, \$16,347,000 was spent.

GOOD DIES

save product cost

DIES are one of the most important factors in the cost of sheet metal parts. When properly engineered, they minimize the number of press operations, required blank size, and the amount of final metal finishing needed. Good die design, plus a wise selection of die steel, reduces marking, pickup and galling—all of which increase the amount of finishing required. ● The steel panels shown above were produced from Cimatool dies, and as none of these photographs have been retouched, all areas that required final metal finishing show up very plainly. A glance indicates how little of this was found necessary. ● Cimatool die designers have a very broad experience in dies for many types of product—large dies as well as small ones. And the Cimatool die department is fully equipped for dies of any type. This equipment includes large crank and toggle presses (796½) for try-out work. When delivered, Cimatool dies are complete in every respect—ready to be put to work. ● Call in Cimatool engineers on your next tool and die job.



THE CIMATOOL COMPANY

Dayton, Ohio, U.S.A.

THIS WEEK IN WASHINGTON

*... Prospects brighten for alteration of Wagner act ...
State Department denies barter plan will upset domestic
commodity prices ... Railroads begin tests to develop
trucks for high speed freight cars ... Forgings leading
item in Government steel buying for week.*

By L. W. MOFFETT

Washington Editor, *The Iron Age*

WASHINGTON — The House Labor Committee's decision to hold hearings on the Wagner Act, testimony of Senator Wagner that he would support with "appropriate safeguards" a change in the law to give employers the right to petition for collective bargaining elections, and the NLRB announcement that it is "open minded" on four proposed changes were interpreted this week as enhancing the chances for more favorable congressional consideration of pending moves to revise the law.

The Senate Education and Labor Committee launched public hearings last week and heard Senator Wagner, Democrat of New York, and co-author of the law which bears his name, as the first witness. Briefly, the four bills up for consideration by the Senate committee can be cataloged this way:

1. One by Senator Walsh, Democrat of Massachusetts, which is being actively pushed by the AFL, would give priority to existing craft unions in collective bargaining controversies with the CIO, would prohibit invalidation by the NLRB of craft union contracts to give recognition to industrial union contracts and would specifically empower employers to petition the board for collective bargaining elections.

2. One by Senator Burke, Democrat of Nebraska, outspoken critic

of the NLRB, embodies most of the changes sought by business groups, including a provision making unions as well as employers responsible for unfair labor practices, a proposal to increase the authority of Federal courts over NLRB decisions and one to replace the present board with three new members.

3. One by Senator Holman, Republican of Oregon, would abolish completely the existing law and establish a labor relations commissioner in the Department of Labor. Operating independently of the department would be a nine-member labor board of appeals.

4. One by Senator Logan, Democrat of Kentucky, would exempt agricultural industries from the law.

Industrialists May Testify

Almost identical bills are pending in the House where the labor committee is making plans to conduct hearings simultaneously with the Senate committee sessions. Chances for favorable action in the House are deemed to be better than in the Senate side and public hearings, allowing industrial spokesmen to appear in opposition to the present Wagner Act and to its allegedly one-sided administrative agency, are expected by some Congressional members to muster up additional enmity to the law.

Senator Wagner's statement to the

Senate committee last week marked the first time he has entered the Wagner Act controversy and was interpreted by AFL President William Green, as indicative that the Senator is in general accord with the AFL proposals. Green, however, pointed to several instances where Wagner did not go along with the AFL when he appeared in defense of the law. For example, the New Yorker objected to the use of the word "interference" in the section covering unfair labor practices by employers, but the AFL president defended this as necessary because the NLRB has "stretched the word 'interference' to cover any and all situations." He added that many of the board's interpretations have been so far-fetched as to confound the intent of the law and that to remedy such abuses of discretionary power a provision setting forth what actually constitutes employer interference with the legitimate activities of labor unions is essential.

Plain Statements Urged

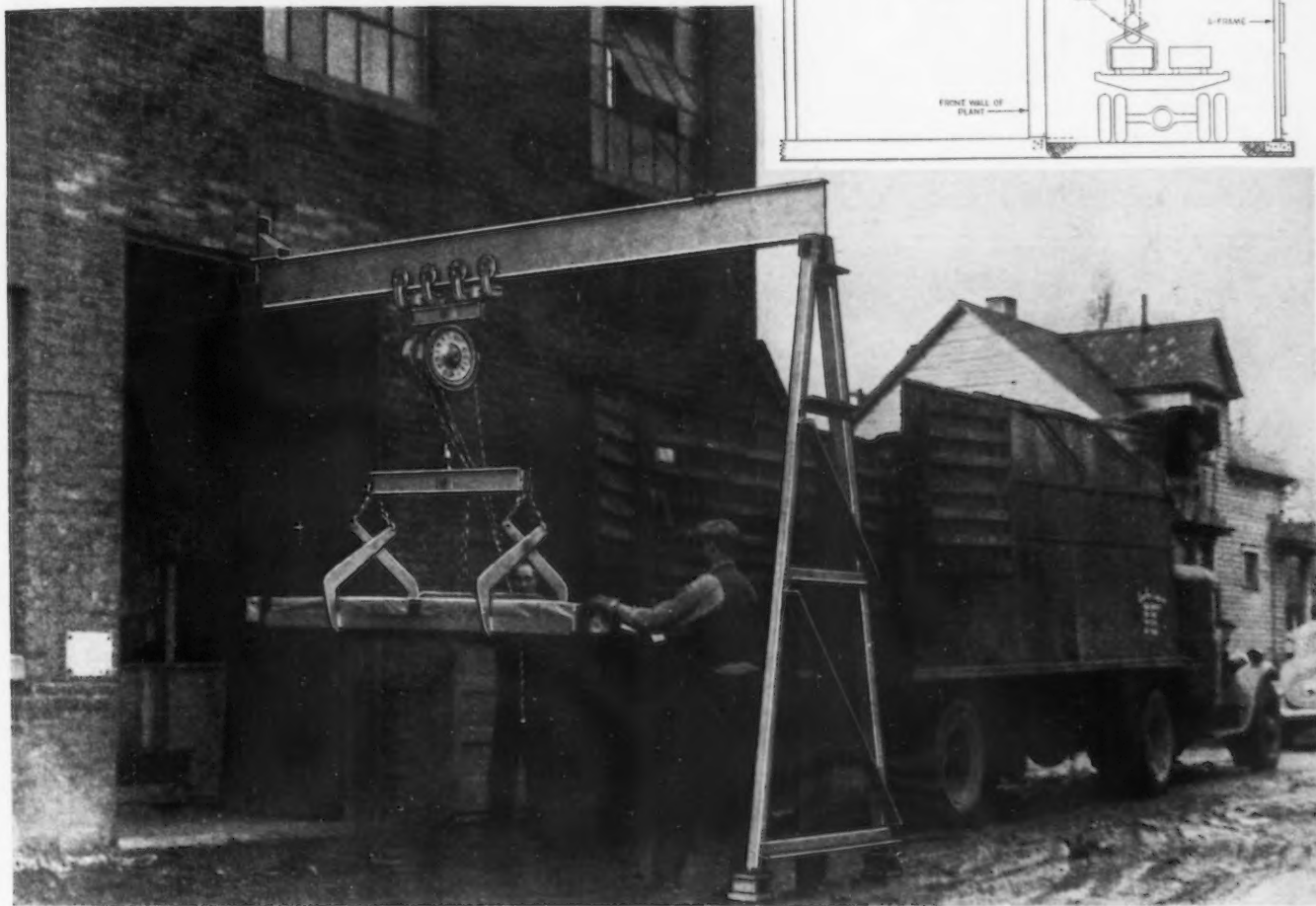
"We want the rules of the game plainly stated in the law so that they can be fully understood by workers, employers and the board alike," Mr. Green said.

As for the policy of permitting employers to petition for collective bargaining elections, Senator Wagner expressed the view that the board could institute such a change under existing rule-making powers. If not, he declared, there should be legislation toward that end "unless these hearings develop compelling reasons which we do not now see why such a change would impair the objectives of the act." Unusual significance was attached to this statement because there have been reports that the Senator has recently urged the board to inaugurate certain changes in its administrative rules of procedure but that the NLRB had remained impervious to the suggestions.

NLRB Opposes Amendment

The Board, in a 360-page analysis of the pending bills to revise the law,

Retractable Crane cuts handling costs!



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In four months this simple MonoRail system saved \$150.00 in handling costs. Steel, formerly unloaded sheet by sheet, is now transferred from delivery trucks to storage in 3-ton bundles. Handling labor was greatly reduced, while damage to metal was eliminated.

When not in use, the crane shown in the illustration above is drawn up, over the doorway, against the building to allow passage through driveway.

This system is typical of the hundreds of specially engineered projects illustrated in a new 254 page catalog now available. It represents the service available at no obligation regardless of the size of project.

Let an American MonoRail engineer explain the possibilities of an overhead handling system in your plant. Write for copy of the new catalog.

The American MonoRail Co

13103 Athens Ave., Cleveland, Ohio

outlined to the Senate committee four specific propositions on which it said it had an "open mind." These were:

1. That employers be allowed to file petitions for certification of employee bargaining representatives.

2. That further legislative guides be passed for determining "appropriate bargaining units."

3. That the law be revised to provide additional safeguards for preservation and clarification of con-

tracts but that the present power to invalidate contracts be left intact.

4. That at least 10 days of grace, in lieu of the present five days, be allowed between issuance of a NLRB complaint and the opening of a hearing.

While these four points were generally regarded as indicative that the Board is to some extent yielding to Congressional, business and some say, inner-Administration pressure, the Board said flatly that it is unconvinced

"by its experience or by any arguments which have come to its attention that the act requires amendment at the present time."

Bills "Objectionable"

In its report, which had been requested by Chairman Thomas of the Senate Labor Committee, the Board referred to each of the four bills pending in the Senate, gave a brief analysis of the provisions of each and concluded that, aside from the four propositions on which it expressed "an open mind," the remaining proposals are "definitely objectionable."

"Many are not only in conflict with the basic purposes of the act but would, taken singly or in combination, effectively nullify the rights of self-organization and collective bargaining which the act is designed to protect," the Board continued. "Others, while not striking at the root of the act, would drastically curtail the rights now guaranteed by the act or substantially impair its effective administration."

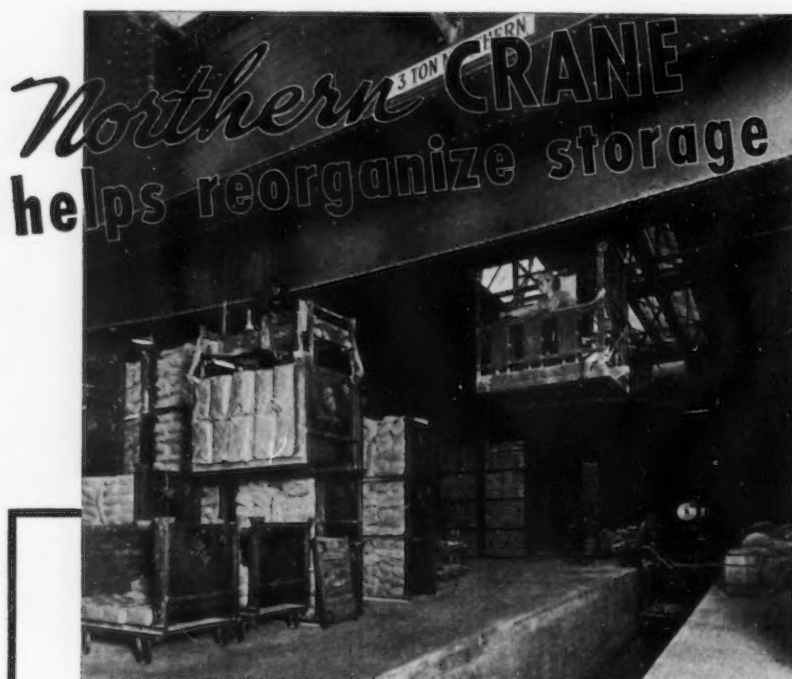
In the opinion of the Board, to permit employers to file petitions for elections would be to "open the election machinery to possible serious abuse" and to make mandatory the designation of craft unit bargaining groups, as proposed by the AFL in the Walsh amendments, "would impose an intolerable administrative burden."

Would Increase Strife

Referring to all bills designed to revise the law, the board asserted that they "would increase rather than alleviate industrial strife, that they will in the long run benefit neither industry nor any labor group, that they will lead to a tremendous growth of company unionism, that they will, in short, destroy freedom of self-government organization and restore many of the conditions prevailing before passage of the act."

AFL Union in Ohio Keeps Right to Bargain

WASHINGTON—The National Labor Relations Board has certified the AFL's pattern makers union as the sole collective bargaining group for pattern makers at the William Powell Co. plant at Cincinnati. The board said that the AFL craft union represented the pattern makers long before the SWOC's organizing drive in February, 1937, and that all other employees at the plant are represented by the SWOC.



THE warehouse gang used to handle every sack of frit (raw material for porcelain enamel) by hand, to and from piles 15 feet high. This was the hardest kind of labor and produced clouds of chemical dust which settled all through the plant.

Now a 3-ton Northern Crane handles U-shaped pallets, each carrying two tons of frit as a unit. There is no more heavy lifting, no dust, no more broken sacks at the bottom of the high pile, and movement to and from storage is very much faster.

Let Northern engineers study your handling problems.

NORTHERN ENGINEERING WORKS, Detroit, Michigan

CRANES *Northern* **HOISTS**

U.S. Overlooks Light Metals, Engineer Tells Senate Group

WASHINGTON — It was reported to the Senate Military Affairs Committee last week that industry has barely scratched the surface in appraising and developing the potentialities of light metals. Willis G. Waldo, consulting engineer of Washington, who appeared in support of a proposal to establish a \$25,000,000 aircraft engineering research center under the War Department, told the committee that the projected \$1,500,000 appropriation for studying methods of improving the quality and reducing the cost of light metals and other structural materials would go far in stimulating the development of light metal resources by private industry.

Engineers in this country, he said, have for some time discounted and neglected the possibilities of light metals other than aluminum. He proposed that the light metal industry be developed along the lines followed by the steel industry where, he said, "there is no monopoly, where a variety of different types of steel are produced and where the public gets the benefit of lower prices."

Cites Lithium, Beryllium

The witness referred specifically to lithium, which he described as light enough to float and having a specific gravity half that of water, and said that while it is used to a limited degree in Germany in the manufacture of aircraft it had found no commercial use in this country. He exhibited for the committee's information several light castings of the alloy manufactured in Germany, explaining that large scale production in that country had not materialized, presumably because of the metal's inability to stand up under stress.

On the other hand, alloys of beryllium, he said, have demonstrated properties for resisting fatigue and combinations of lithium and beryllium offer the possibility of combining the good features of both and providing a superior light metal alloy. Ores containing beryl, from which beryllium is obtained by electrolysis, are found on the Pacific Coast and some authorities say that the earth's crust contains more crude beryl than either lead or zinc.

Exhibiting a small sample of pure lithium and demonstrating its ability to float, Mr. Waldo told the committee that the world's largest supply is found

in a 25-mile vein running between North and South Carolina, although there are quantities of the ore in South Dakota, from which some has been shipped to Germany at a cost of \$40 a ton. After manufacture, Germany has exported small quantities of it back to

this country in the form of lithium chloride, used primarily in air conditioning work and costing at the rate of \$40,000 a ton. Lithium from South Dakota is also purchased in small quantities by a New Jersey concern, which also makes a chloride of lithium for refrigeration work.

In urging passage of the bill to establish the engineering center, Mr. Waldo expressed the view that by developing alloys containing lithium it may be possible by combining it with

**TO STAND UP UNDER PRESSURE
STEEL PICKS PENOLA**

With a pressure of 5,000 pounds per square inch crushing down on a \$10,000 roll neck bearing, a steel man can't afford to take any chances. He must have an extreme-pressure lubricant that he can depend on to do a consistent job of gear-protection, no matter how tough the going is. So he specifies Penola!

These two facts tell a powerful, convincing lubrication story:

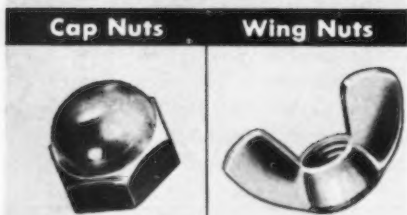
- Over 80% of all roll neck bearings in 4-high mills are Penola-lubricated.
- Penola makes and sells more steel mill lubricants than any other maker in the world.

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PRODUCTS of an improved process developed through years of experience in the manufacture of precision screw products, Parker-Kalon Cold-forged Socket Screws, Cap Nuts, Wing Nuts and Thumb Screws possess that *strength, uniformity and accuracy* that spell Q-U-A-L-I-T-Y. Stocked by reliable industrial distributors near you. Write for free samples . . . compare . . . see for yourself.

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other alloys to give it the desired properties of an engineering metal, and may be used, for example, in the manufacture of engines so light they can float.

Lithium, the lightest of all metals, is alloyed with aluminum, beryllium and, to give it hardness, with lead. Beryllium is lighter and harder than aluminum but when alloyed with aluminum produces a lighter material, with a higher melting point and of greater strength. The high cost of production is generally credited with having prohibited its use commercially.

The witness, asserting that if Germany had the mineral resources of the United States it would organize a cartel to exploit the light metals beyond the stage of development reached thus far, referred to the Tennessee Valley as one spot in this country where he said that available mineral and power resources could be utilized to make in one operation smokeless powder and three light metals—magnesium, calcium and lithium.

Germans Speed Aluminum Output

Other developments brought to the committee's attention were that Japan plans to increase its production of magnesium 1000 per cent and that although Germany has no bauxite ore from which to make aluminum, that country's aluminum production—apparently reflecting the expansion of its aircraft industry—was increased more than 6½ times from 1932 to 1937.

The bill, whose passage was urged

by Mr. Waldo, calls for a \$25,000,000 appropriation for the aircraft engineering center to serve as a yardstick of determining costs of aircraft construction. In addition to the research station of chemistry, electrochemistry and electro-metallurgy under the Bureau of Mines for exploring the field of light metals and other structural materials, it would authorize the Bureau of Standards, which would receive a \$1,000,000 appropriation, to improve new physical and chemical processes in the interest of national defense.

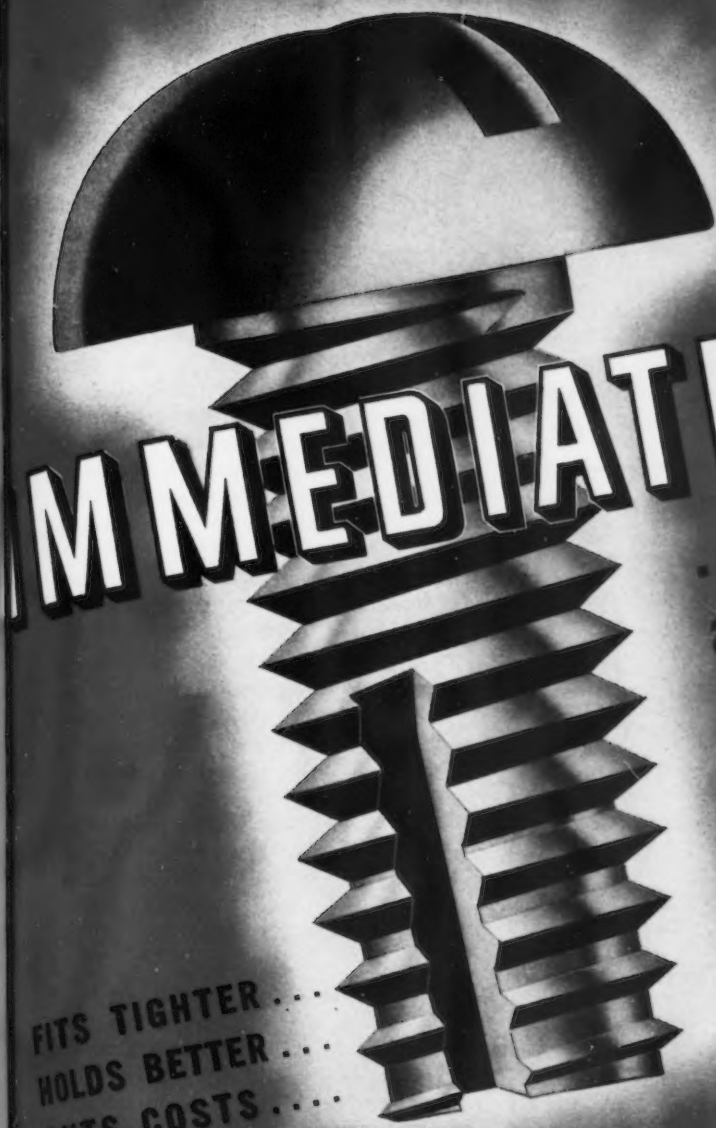
Stream Pollution Bill May Appear as Rider

WASHINGTON—A stream pollution control bill sponsored by Senator Clark, Democrat of Missouri, and going beyond the so-called "mild" form of measure favored by industry, may be attached as a rider when the Barkley bill comes up for consideration on the Senate floor. This action may send the bill back to committee, thereby lessening chances for the passage of anti-pollution legislation at the current session of Congress.

Koppers Co., Pittsburgh, has been awarded the contract for six slide gate valves to be used in the new Mahoning flood control dam above Pittsburgh. Each gate will be 10 ft. x 5 ft. 8 in. and they are to be constructed of a special bronze alloy to resist the corrosive effect of the polluted water. These gates will be fabricated at the Bartlett Hayward division plant at Baltimore.



THREE generations of Fords were recently photographed at the Ford Motor Co.'s exhibit at the New York World's Fair. In the center is Henry Ford, at the right Edsel Ford and at the left Henry Ford II. The representative of the third generation is a junior at Yale.



IMMEDIATE SAVINGS

... Stronger Fastenings
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SHAKEPROOF

Thread-Cutting Screws

FITS TIGHTER ...
HOLDS BETTER ...
CUTS COSTS

Shakeproof Thread-Cutting Screws actually cut their own threads in metals of any thickness. Stronger fastenings are assured because each screw stays in the threads it has cut—a tight, perfect fit is always certain! And, because Shakeproof Thread-Cutting Screws are made with U. S. Standard Machine Screw Threads, they drive easily, even in thick material, and in case replacement is ever necessary, an ordinary machine screw of the same size may be used.

Tapping is a needless waste!

By means of the patented thread-cutting slot plus a special hardening process, each screw taps and fastens in one operation. Thus, the expensive separate tapping operation is eliminated, which immediately results in important time and money savings. Investigate the possibilities for this screw on your assembly line. See how it cuts costs, increases fastening efficiency and adds to the quality of your products. Price list and free testing samples are available on request—write for yours today!

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235 N. Keeler Ave., Chicago, Ill. In Canada: Canada Illinois Tools, Ltd., Toronto, Ont.
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HERE'S THE DIFFERENCE...

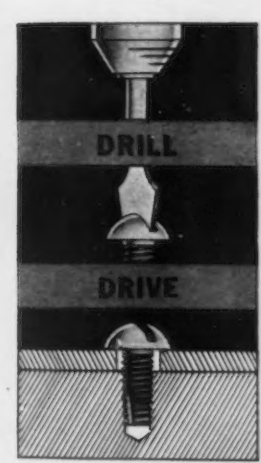
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Lock Washers . . . Locking and Plain Terminals
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Tests on High-Speed Freight Cars Start

WASHINGTON—The railroads are about to begin comprehensive tests under auspices of the Association of American Railroads to determine what improvements can be made in the construction of freight car trucks in order to better fit them to meet operating conditions resulting from greater high-speed service.

In announcing the plans, J. J. Pelley, president of the association, said that the tests are expected to result in the development of a freight car truck that can be used on freight trains moving at speeds as great as the fastest passenger trains now being operated in the United States. Pending the tests there has been no indication of what changes in structural design or metal, if any, may be made. Approximately one year will

be required to complete the tests and the preparation of a report.

The road tests will be run over the Pennsylvania Railroad from Altoona to Lock Haven, Pa., a round trip distance of 156 miles. They will be under the general direction of W. I. Cantley, mechanical engineer, mechanical division of the association. W. E. Gray, engineer of draft gear tests of the association, will be in direct charge of the tests. Their purpose, it was announced, will be to bring about: still greater improvement in safety on the railroads; a continued improvement in service by expediting still further the movement of freight; reduced maintenance, both to equipment and roadbed, and increased efficiency in operation.

Railroad freight car truck manufacturers have turned over to the association about a dozen different types of trucks. Each one will be given a separate and thorough test under varying conditions, both as to load of cars and to speed. Tests will be made every other day. The intervening time between each run will be devoted to installing the various trucks and to making changes in the load of the cars.

"The railroads in recent years have made material increases in the speed with which freight is being moved over the rails," said Mr. Pelley. "Due to improvement in locomotives and freight cars and methods of operation, the average speed of freight trains in 1938 was 61 per cent higher than in 1920. In many instances freight trains are now being operated on what were formerly passenger train schedules."

Hitler Now Part Owner Of Swedish Mines

WASHINGTON—When Germany took over Moravia as part of Czechoslovakia, Hitler acquired substantial interests in several small iron mines in Sweden, one of which is owned by the Freja mining company which in 1937 produced 376,000 tons of ore.

Reports to the Commerce Department from the American Consulate at Stockholm indicate that in its occupation of Moravia, Germany gained control of the Vitkovice iron works which owned a substantial interest—some reports say as much as 50 per cent—in the Freja mining company in Lapland, Sweden. The Freja company also owns iron mines at Kossulikkulle, Sweden, the reports said.



FORGING LANDING-GEAR BRACKETS...

Another ERIE, Of Course! The Aviation Industry demands the sturdiest and lightest parts made from heat-treated alloy forgings... extreme accuracy in fabrication... strictest inspection to protect human life in the air. Naturally, many airplane forgings are made on Dependable ERIE Hammers. This 3000 lb. ERIE Steam Drop Hammer is in action in the shops of a large supplier of aviation forgings... The experience in engineering design and the more-than-adequate construction, which 36 years of constant improvement have made available to you, in ERIE Steam and Board Drop Hammers cost you nothing extra... result in better forgings at lower cost... It will pay you well to write for bulletins 325 and 328 on ERIE Steam and Board Drop Hammers.

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ERIE BUILDS Dependable HAMMERS

Head of Life Savers, Inc. Assistant to Hopkins

WASHINGTON—Edward J. Noble, organizer of Life Savers, Inc., New York, and new executive assistant to Secretary of Commerce Hopkins, advanced the idea last week that "the psychological attitude of business" holds the key to business recovery.

Mr. Noble, who was promoted from chairmanship of the Civil Aeronautics Authority to take direct charge of the Bureau of Foreign and Domestic Commerce, did not indicate just how a change of attitude could be brought about but pointed out at his first press conference that "we've first got to do certain concrete things." He recalled that Secretary Hopkins already had pledged cooperation with business.

Mr. Hopkins plans to ask Congressional authorization for the creation of the post of Under-Secretary of Commerce, which Mr. Noble will assume. During the interim he will continue as executive assistant and will, according to Mr. Hopkins, "make a distinct contribution to the department's efforts toward recovery."

Secretary Hopkins will make his second public bow since his appointment to the Commerce Department when he addresses the 27th annual meeting of the Chamber of Commerce of the United States on May 2. The sessions will continue through May 4.

Court Reaffirms Duty On Knives, Shear Blades

WASHINGTON — The United States Court of Customs and Patent Appeals has affirmed rulings of the United States Customs Court upholding the assessment at 40 per cent on knives or shear blades as shears for use in fabricating rolled iron or steel shapes and the assessment of galvanized, corrugated iron sheets at $\frac{3}{4}$ c. per pound plus 1/5c. per pound for being galvanized. In the former case, Otis McAllister & Co., importers, protested that the knives or blades were properly dutiable at 20 per cent as "all other knives and blades" used in power or hand machines. In the latter case, F. F. G. Harper & Co., and others, protested that the sheets were properly dutiable at 1/5c. per pound or at 20 per cent as structural shapes of iron or steel.

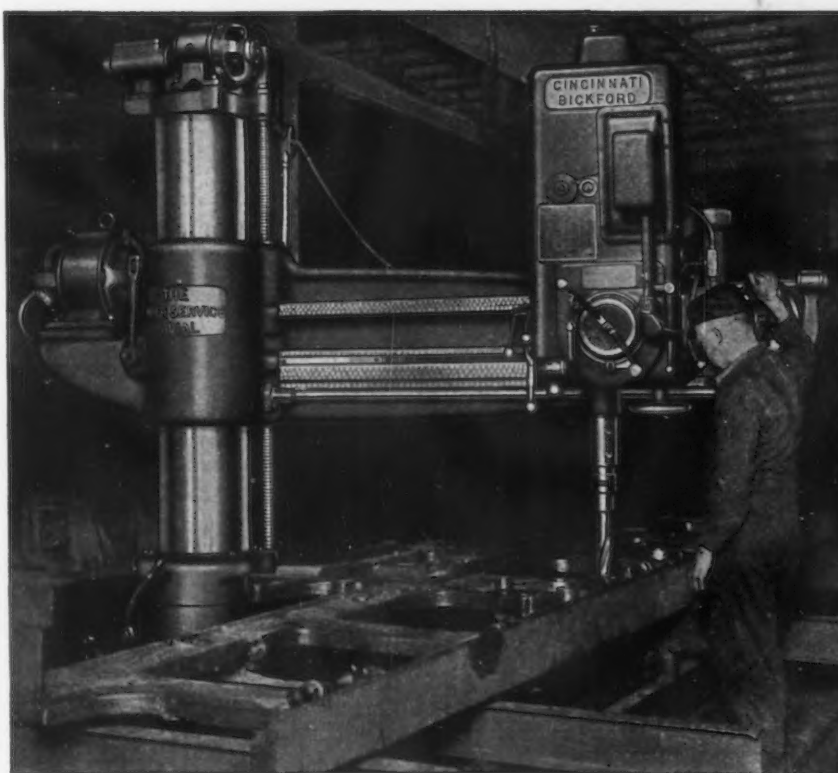
Algoma Steel Corp., Ltd., Sault Ste. Marie, Ont., has been licensed to produce Ledloy, the new lead-bearing steel developed by Inland Steel Co.

Alcoa Workers to Choose Between AFL and CIO

WASHINGTON—The National Labor Relations Board has called an election at the Alcoa, Tenn. plant of the Aluminum Company of America to permit employees to vote for either the AFL's Aluminum Workers Union or the CIO's Aluminum Workers of America, as exclusive collective bargaining representative.

Republic Steel Moves Foundry to Ohio Town

CLEVELAND—The Ideal Foundry Co. of Republic Steel Corp., located at Beaver Falls, Pa., is to be moved to Newton Falls, Ohio. The foundry, which makes castings for Republic plants, will occupy approximately 60,000 sq. ft. in a more central location with respect to producing plants.



Convenient Low Controls At the Head Essential For Work Like This

Especially on big work centralized control at the drilling position makes important savings. Controls for all speeds and feeds—electric column clamping—arm clamping and elevation to the arm—power rapid traverse—controls for these and all other operations of the SUPER SERVICE RADIAL DRILLS are always within easy reach from the drilling position. Think what time and energy are wasted when that is not the case! Yet most of the radial drills in use today do not have this money saving feature of 100% centralized control at the head. Do yours?



Write for Bulletin R-24.

THE CINCINNATI BICKFORD TOOL CO.
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U.S. Denies Barter Plan Will Upset Commodity Prices

WASHINGTON — Seeking to allay fear "expressed in some quarters" that markets for surplus commodities (wheat and cotton) held by the United States Government would be upset and prices depressed through their exchange for

tin and rubber the State Department last week issued a statement saying this Government is not seeking to force American surplus commodities into the world's markets by any scheme to exchange or barter them for strategic materials. The American surpluses, it was stated, will be available for exchange only if foreign governments are interested in acquiring them for war reserve stocks.

"The idea now being explored is confined to the acquisition of strategic

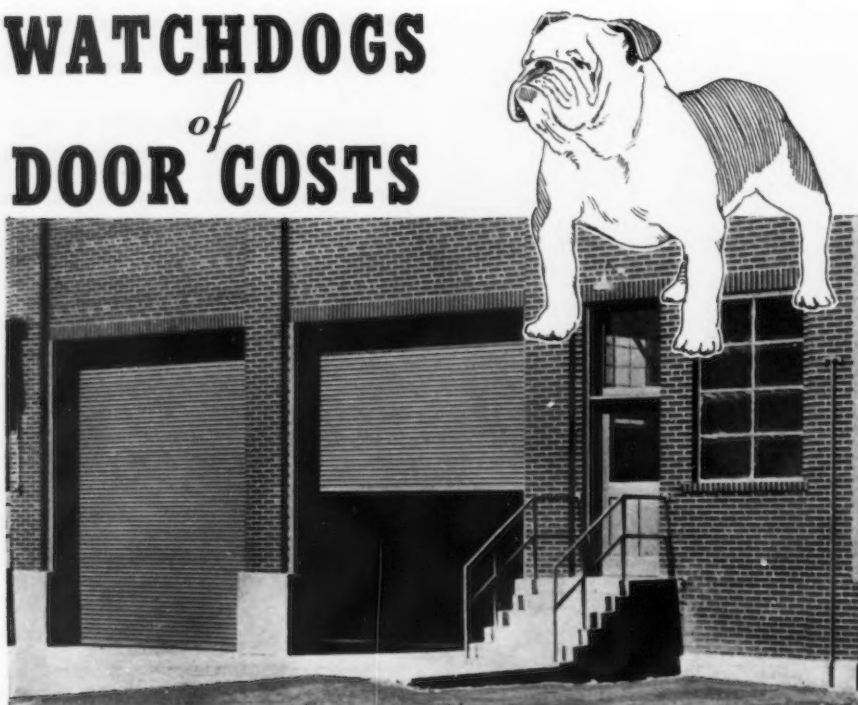
materials, and strategic materials only, as reserves for national emergencies when necessary supplies of these materials from abroad might be cut off or greatly reduced, as in the case of widespread international conflict," the statement said.

On the other side of the case, it is reported that some concern has been shown lest the barter boost still further the prices on tin and rubber. While this phase of the subject was not dealt with in the statement it is known that the barter plan will be operated with a view to preventing price rises.

The State Department also denied charges that the reciprocal trade agreement is being abandoned and commercial policies reversed.

"One of the essential features of such an arrangement would be an agreement on the part of other governments as well as our own to hold the acquired stocks as reserves for war emergencies with entirely adequate arrangements for permanently withholding such stocks from commercial markets," it stated. "Hence, the plan, if any arrangements of this character can be successfully worked out, would not interfere with the trade agreements program or conflict with our commercial policies."

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Kinnear Rolling Doors are mighty tough customers when it comes to protecting doorways and door costs. Dependable watchdogs . . . constantly on guard against inefficiency! And their blue-ribbon performance has been proved in continuous daily service over a period of more than forty years.

Opening upward and coiling compactly above the lintel, Kinnear Doors save valuable floor and wall space. They stay out of the way when open . . . out of reach of accidental damage by trucks and cars, or wind. Their rugged all-steel construction and interlocking-slat design assure exceptional durability. They will not sag, warp, split or pull apart, and they protect against fire, vermin, burglary and the elements. All of which mean lower operating and maintenance

costs! Every Kinnear Rolling Door is specially built, for manual or electrical operation, to exactly fit the opening for which it is intended. That helps to keep installation costs at the very lowest. And remember, Kinnear Door Service is backed by a nationwide organization of specialists in the designing and building of upward-acting doors. Take advantage of Kinnear's complete door service . . . Write today for details or recommendations to fit your own problems!

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FACTORIES: COLUMBUS, OHIO — SAN FRANCISCO, CAL.

Steel Floor Data Issued By Bureau of Standards

WASHINGTON—In one of a series of reports on structural properties of materials for low-cost houses, the Bureau of Standards has released a bulletin on "Wheeling long-span steel floor" construction submitted by the Wheeling (W. Va.) Corrugating Co. Copies are available at the Government Printing Office in Washington.

The bureau reports on load-deformation relations and strength of structures on the basis of tests covering transverse, impact, and concentrated loads, using standardized methods for simulating conditions comparable to actual service. The construction is described as sheet-steel channel-shaped joists, assembled by welding the wide overlapping upper flanges to form a continuous sheet-steel subfloor to which the finished floor and ceiling are attached.

Chase Brass & Copper Co., Waterbury, Conn., has opened a sales office in the Genesee Valley Trust Building, Rochester, N. Y., with C. L. Moseley as district sales manager, and Don S. Stauffer as assistant.

Pullman Engineer Reports 80 Lightweight Trains in Use

CHICAGO—There are now in operation or on order for early delivery 80 lightweight trains comprised of 682 cars, according to W. H. Mussey, engineer of research, Pullman Standard Car Mfg. Co., Pullman, Ill., who spoke recently on "Modern Railroad Cars" before the Chicago section of the A.S.M.E. In addition, he said, a number of lightweight cars are being mixed with the conventional type, the total number of lightweight cars built or on order amounting to 1339 at the present time.

The average car, Mr. Mussey pointed out, weighs about two-thirds of the conventional car, enabling higher speeds, and an increase in the number of cars hauled at high speed with the same power plant. "Time saving," he continued, "combined with hitherto unheard of luxury and improved riding have attracted the traveling public to such an extent that though the new type cars cost considerably more than the car of six or seven years ago, they produce revenues which wipe out the investment in a relatively short time."

One Train Earns \$500,000

Citing an example where a lightweight train was put into service in place of a conventional type train, he showed that nearly half a million dollars additional revenues were produced, and concluded thereby that, "... railroads can well afford to buy this equipment even in their present financial condition."

Similar instances cited by Mr. Mussey showed the financial gains to be realized from the use of lightweight freight, hopper and open top cars. Discussing what he considers the three outstanding materials, Mr. Mussey said 18-8 stainless steel derives its high tensile properties from severe cold rolling, and has about the same weight a cubic foot as normal open-hearth steel.

He said that the structural or stress sections used in car construction are of the drawn molding type made from strips, plates or sheets. Corner reinforcement, or reduction in the $\frac{d}{t}$ ratio must be obtained by welding, or otherwise fastening additional strips or drawn sections to the base section.

Strength as well as lightness is called for in modern freight cars. Mr. Mussey pointed out that low carbon steel allows limited savings in weight, low alloy high tensile steel being the only material that will meet all available requirements. "We have designed,

built and tested such cars in production and they are in service and not on the repair track," he declared.

Lightweight Box Cars

The commercial production welding technique employed by Pullman at its Pullman, Ill., car works, which was described by Mr. Mussey in his paper was covered fully in *THE IRON AGE*, Dec. 23, 1937, and Sept. 1, 1938.

"One hundred lightweight box cars



WHERE TIME IS MONEY

In any modern industry time is an important factor in production.

The constant demand for new metal finishes—for faster cleaning and finishing operations means that any problem that comes up has to be licked—and licked in a hurry.

For more than a third of a century Wyandotte has been working hand in hand with metal finishers to perfect metal-cleaning compounds. Each one represents a problem that has been solved.

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are in service on the Bessemer & Lake Erie, 50 on the Chicago & Great Western, and 50 on the Union Pacific. They have been in service upwards of six months and frequent inspections have shown the absolute absence of any defects whatever.

"The building of these cars has proved our statements from time to time that the cars can be built in quantity without any increase in cost over the conventional car," concluded Mr. Mussey.

Koppers Co. Awarded Wheeling Contract

PITTSBURGH—The Wheeling Steel Corp. has awarded a contract to Koppers Co. for the design and construction of Benzol refining apparatus and equipment at its Koppers by-product coke plant in Follansbee, W. Va. The contract also includes the modernizing of the corporation's ammonium sulphate drying and tar removal equipment. Completion of the work is expected by Aug. 15.

Forgings Lead in Government Buying

WASHINGTON — Government contracts for iron and steel products, as reported by the Public Contracts Division of the Labor Department for the week ended April 8, amounted to \$327,700; for non-ferrous metals and alloys, \$12,895; and for machinery, \$343,674. Details are listed below.

Iron and Steel Products

The Steel Improvement & Forge Co., Cleveland, steel forgings ...	\$21,567.60
The Midvale Co., Nicetown, Philadelphia, steel forgings	226,325.00
Diebold Safe & Lock Co., Canton, Ohio, services to finish machine castings	14,944.00
Youngstown Sheet & Tube Co., Youngstown, reinforcing steel ...	11,512.49
Carnegie-Illinois Steel Corp., McKeesport, Pa., steel, sheet	19,327.95
Hart Mfg. Co., Louisville, Ky., stoves, heaters, ranges	20,723.50
Protectoseal Co., Chicago, steel safety cans	13,300.00

Non-Ferrous Metals and Alloys

The Aluminum Cooking Utensil Co., New Kensington, Pa., aluminum stock pots	\$12,895.00
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Machinery

Lloyd & Arms, Inc., Philadelphia, precision lathes	\$10,239.00
Marshall & Huschart Machinery Co., Chicago, boring mill	24,240.00
The Hanson-Whitney Machine Co., Hartford, Conn., milling machines	19,717.94
Austin-Hastings Co., Inc., Cambridge, Mass., engine lathes	23,154.00
The Hendey Machine Co., Torrington, Conn., modifying and modernizing lathes	11,170.00
Worthington Pump & Machinery Co., Harrison, N. J., centrifugal pumps	143,878.50
Thomas Machine Mfg. Co., Pittsburgh, pump parts	33,544.00
Lidgerwood Mfg. Co., Elizabeth, N. J., steam winches	77,731.00
Milwaukee Electric Tool Corp., Milwaukee, Wis., electric drills, hammers	Indefinite
The New Home Sewing Machine Co., Rockford, Ill., sewing machines	Indefinite
Singer Sewing Machine Co., New York City, sewing machines	Indefinite

Industry Will Back An Amended Wagner Act, Girdler Says

INDUSTRY will support the Wagner Act if it is amended to make it a "good" law, Tom M. Girdler said last week in an address at the annual dinner in New York of the Ohio Society of New York.

The people in Ohio and Indiana (Mr. Girdler's native state) are all believers in law and order, the Republic Steel Corp. chairman said. "They will support those laws if they are good. I don't care whether it is the Wagner Act or not; if it's a good law it ought to be supported. If you have to make a bad law into a good law by emasculating it, then you'd better emasculate it."



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Forgings
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Heavy Springs
Rolled Rings
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STEEL CASTINGS THAT DEMAND EXPERIENCE

This casting — a steel stern frame—typifies the class of difficult steel castings produced by Standard. Prompt service in the production of steel castings and heavy forgings is made possible by our ample equipment and broad experience.

The steel used in Standard's products is acid open hearth produced in our own furnaces under close metallurgical control.

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WORKS: BURNHAM, PA.

STANDARD

Machinery's 10th Handbook Gives New and Revised Data

NEW or revised engineering and manufacturing standards, current machine shop practice data, and general information required by designers and builders of mechanical products are included in the 10th edition of Machinery's Handbook, recently published by the Industrial Press, 148 Lafayette Street, New York. The new volume comprises 1815 pages, 4½ by 7 in., divided into 134 main divisions. It has about 250 more pages than the previous edition and more than 447 pages not in editions earlier than the ninth. Erik Oberg and Franklin D. Jones are the editors of this handbook, the first edition of which was published in 1914.

New features include standard mounting dimensions for different types of electric motors; British standard limits and fits for holes and shafts; the American standard for different gages; selection of tool steels for different classes of tools; tables for checking gear sizes by the pin and chordal methods; standard grinding wheel shapes and dimensions; standard forming tool blanks; and standard tolerances for forgings. Also American standards for drawings and standard abbreviations and symbols; selection of lubricants for bearings; standards for V-belt drives; steels for gearing; brass, bronze and non-metallic gearing; recent set screw standards; new hardness conversion tables; and checking screw thread sizes. The price of the new handbook is \$6.00.

Aetna Standard Finds Business Ahead of 1938

YOUNGSTOWN—Jerome R. George, president and chairman, Aetna-Standard Engineering Co., Youngstown, reported business for the first three months of this year substantially ahead of that for the corresponding period of 1938. "We are hopeful," he said, "that this will continue for the entire year."

Berger Division Installs Equipment

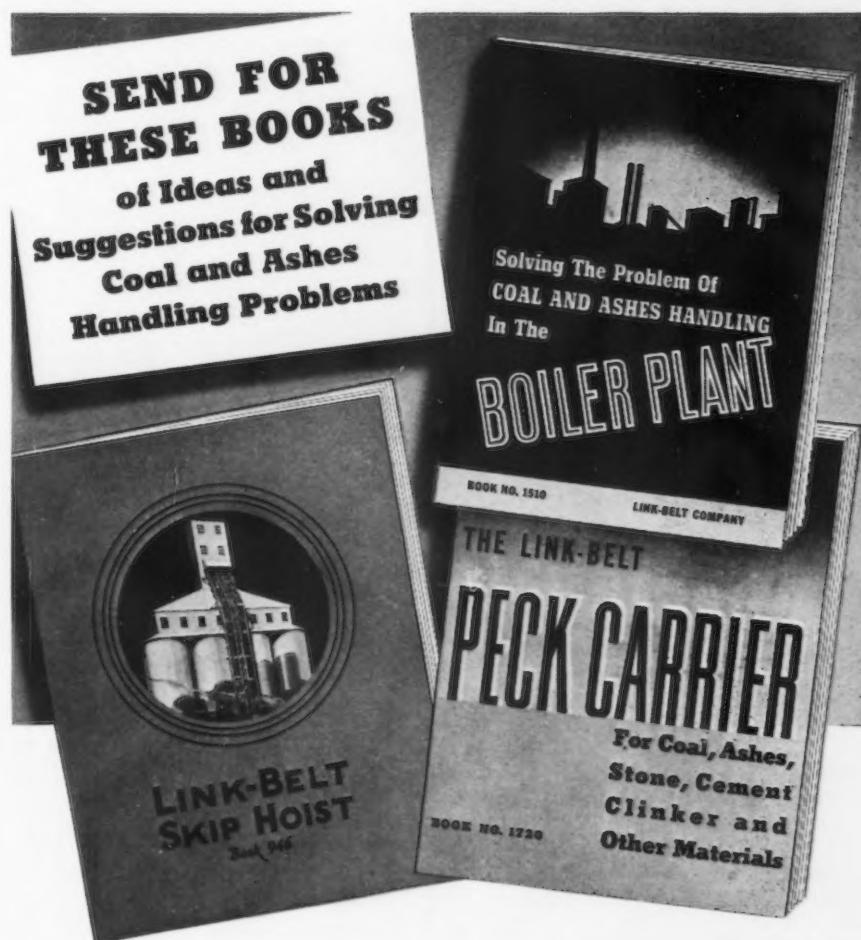
CLEVELAND — Modernization and rearrangement of equipment has been started at the Berger Manufacturing Division of Republic Steel Corp., in Canton, Ohio. Installations will include new presses, conveyor oven equipment, new conveyor lines and new air-conditioned rooms for painting.

Westinghouse Sees 1939 Better than 1938

PITTSBURGH—Expectations are still strong that 1939 will be better than 1938, although there may be a slight recession in the summer, Westinghouse Electric & Mfg. Co.'s board chairman, A. W. Robertson, said last week at the company's annual meeting. He declared that orders for electrical equipment were almost 33 per cent ahead of last week. First quarter business amounted to \$50,120,832.

compared with \$37,998,569 for the first period in 1938.

Referring to profits, Mr. Robertson said, "Many persons believe that workers in American industry produce considerably more than they receive; that a huge 'profit' accrues to the company from the services of each person employed. Analysis discloses that the average Westinghouse employee contributes approximately \$13 a month towards the dividends of the company. His average wage in 1938 was \$1662."



● These 3 catalogs thoroughly cover the subject—illustrate practically every mechanical method for getting coal to the boilers and disposing of the ashes.

Book No. 1510—32 pages; containing installation photographs and drawings, as well as many helpful hints on the selection and application of all kinds of elevating and conveying equipment.

Book No. 1720. Illustrates and describes the Peck Carrier. The one machine handles both coal and ashes, *carrying* both horizontally and vertically.

Book No. 946. Shows many applications of the Skip Hoist—the machine that is often the best elevating medium for high lifts. . . . Send for any or all books. *Return the Coupon.*

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<input type="checkbox"/> Book No. 1720		City _____ State _____	
<input type="checkbox"/> Book No. 946			

THE NEWS IN BRIEF

Exports of machine tools to Great Britain likely to decline; those to Japan increase.—Page 45.

Automobile dealers cautious regarding second quarter prospects. Assemblies continue at a steady level, some companies slightly up, others down.—Page 49.

Alvan Macauley becomes chairman of Packard, and M. M. Gilman, 20 years a Packard man, moves up to presidency.—Page 49.

Railroads spent \$152,167,000 for iron and steel products during 1938 compared with \$359,409,000 in 1937.—Page 51.

Outlook improves for alteration of Wagner Labor Relations Act.—Page 52.

NLRB certifies right of AFL pattern makers to act as bargaining agent for themselves at Cincinnati plant.—Page 54.

U. S. overlooks potentialities of light metals like lithium and beryllium, engineer tells Senate Military Affairs Committee.—Page 55.

Three generations of Fords at the World's Fair.—Page 56.

Stream pollution bill less mild than that favored by industry may be attached as rider to Barkley bill.—Page 56.

Railroads begin tests on high-speed freight cars.—Page 58.

Herr Hitler acquires interests in Swedish iron ores through seizure of Czechoslovakia.—Page 58.

Aluminum Company workers at Alcoa, Tenn., will decide in NLRB election between AFL and CIO.—Page 59.

Republic Steel Corp. moves Beaver Falls, Pa., foundry to Newton Falls, Ohio.—Page 59.

U. S. Court of Customs and Patent Appeals upholds 40 per cent duty on knives and shear blades.—Page 59.

Organizer of Life Savers, Inc., to be new Under Secretary of Commerce.—Page 59.

State Department denies that plan to barter surplus commodities for

war reserve stocks will depress commodity prices.—Page 60.

Steel floor data report is issued by U. S. Bureau of Standards.—Page 60.

Pullman engineer reports 80 light trains now in use.—Page 61.

Tests to be started on trucks for high-speed freight cars.—Page 61.

Machinery's 10th handbook gives new and revised data.—Page 62.

American industry would back an amended Wagner Act, Tom M. Girdler says.—Page 62.

Forgings for Navy Department are largest item in Government steel buying during latest reported week.—Page 62.

Koppers Co. awarded Wheeling Steel Corp. contract for expansion of by-product coke plant at Follansbee, W. Va.—Page 62.

Westinghouse Electric & Mfg. Co. executive sees 1939 a better business year than 1938.—Page 63.

Jerome R. George, chairman of Aetna-Standard Engineering Co., reports business running ahead of 1938.—Page 63.

Republic Steel's Berger Division installs new equipment at its Canton, Ohio, plant.—Page 63.

Vascloy-Ramet Corp., North Chicago, Ill., opens a new plant in Jersey City, N. J.—Page 74.

Two additional tests for detecting defects in pipe are adopted by Jones & Laughlin Steel Corp.—Page 74.

American Society for Metals buys house in Cleveland for its national headquarters.—Page 74.

Allegheny Ludlum Steel Corp., issues new house organ, "Steel Horizons."—Page 74.

Dominion Steel & Coal Co. awards contract for tilting open-hearth furnaces to Arthur G. McKee Co.—Page 77.

Building of merchant ships climbs 40 per cent for U. S., declines 40 per cent for Great Britain and Ireland.—Page 77.

Machine tool order index gains for six months. Figure of 185.4 is a gain of 18.3 points over February.—Page 96.

White House clique is "reactionary to democracy, opposes recovery in U. S. because spending gives it power," E. T. Weir declares.

Pig iron output in the U. S. totals 18,546,070 tons in 1938, against 36,129,586 tons in 1937.

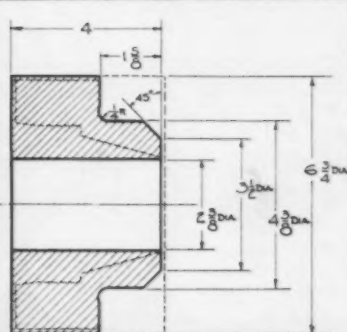
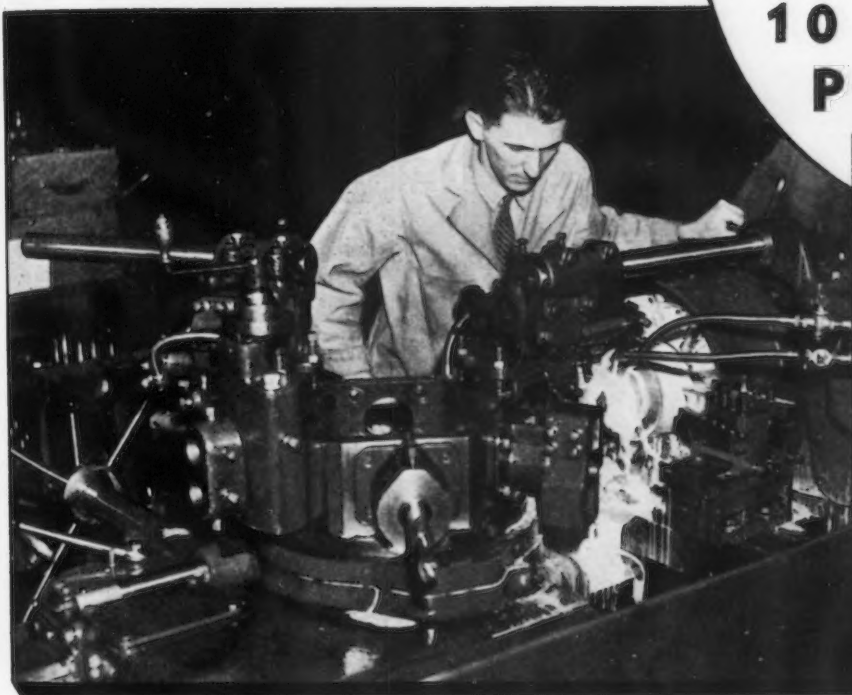
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MEETINGS

April 20 and 21—Concrete Reinforcing Steel Institute, Augusta, Ga.
April 26 to 29—Electrochemical Society, Columbus, Ohio.
May 15 to 18—American Foundrymen's Association, Cincinnati.
May 16 and 17—American Steel Warehouse Association, Chicago.
May 22 to June 8—Society of Automotive Engineers, world congress, in various cities.
May 24 and 25—National Metal Trades Association, Chicago.
May 25—American Iron and Steel Institute, New York.
May 25 to June 1—Triple Convention (American Supply and Machinery Association, the National Supply and Machinery Distributors' Association and the Southern Supply and Machinery Distributors' Association), on board the S.S. Monarch of Bermuda.
June 5 and 6—Associated Machine Tool Dealers, Schenectady.
Oct. 23 to 27—National Metal Congress, Chicago.

HOW TO *Save* 10 MINUTES PER PIECE



FOR lots of 15 parts or less like the collet chuck body, shown above, there is no need to use forgings if you have a No. 7A J&L Saddle Type Turret Lathe on the job. This machine is turning chuck bodies with High Speed Steel tools in 6.5 minutes, *from the solid*, as contrasted with 16.5 minutes per piece on an older type of machine. However, the advanced design allows the full use of carbide tools on larger lots, with even greater savings.

The advanced design of J&L Turret Lathes also makes itself evident in hundreds of installations where manufacturers report holding tolerances easier, removing metal faster, getting better finish, and earning more per dollar invested *with less operator fatigue*.

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... PERSONALS ...

N. J. CLARKE, vice-president in charge of sales, and C. M. WHITE, vice-president in charge of operations, Republic Steel Corp., Cleveland, have been elected directors of the company.

Mr. Clarke began his career as office boy with the Bourne-Fuller Co., Cleveland, later becoming clerk and then member of the sales department.

In 1904 he was placed in charge of the newly opened Bourne-Fuller office in Pittsburgh, where he remained until 1912 when he returned to Cleveland as secretary and sales manager of the Upson Nut Co., which had been acquired by Bourne-Fuller.

During the World War Mr. Clarke was a major in the Ordnance Department,



N. J. CLARKE

The new **LIFTABOUT**
ELECTRIC HOIST
CAPACITIES ONE-EIGHTH TO TWENTY TONS

Enclosed Motor Designed for Hoist Service
Hoist Equipped with Roller Bearings Throughout
Suspension Members of Steel
Heat-Treated Steel Gearing Operates in Oil Bath
Multiple Disk Load Brake External Adjustment
External Adjustment of Solenoid Brake
Splined Motor Shaft and Coupling
Oil and Grease Seals
Splined Drum Drive
Safety Type Load Block Fully Enclosed
Integral Drive Shaft and Pinion
Solenoid Disk Brake Splined Wheels

● After thousands of lifts and years of service the perfectly balanced hoisting mechanism of the LiftAbout functions smoothly in its bath of oil. Complete enclosures seal all vital parts against dust, dirt and moisture.

It is available in a wide range of types and sizes. For typical applications and more complete information write for Bulletin No. 126.

A COMPLETE LINE OF CRANES & HOISTS

SHEPARD NILES
CRANE & HOIST CORP.

356 SCHUYLER AVENUE... MONTGOMERY FALLS, N. Y.

ment, returning after the War to Bourne-Fuller as vice-president and general manager.

July 1, 1913, Mr. Clarke organized and became president of Lake Erie Bolt & Nut Co., which later acquired the American Bolt Co. of Birmingham. Dec. 1, 1929, the Lake Erie Bolt & Nut Co., merged with the Foster Bolt & Nut Co. and the Lamson-Sessions Co., continuing under the latter name, with Mr. Clarke as vice-president. He was made vice-president in charge of sales for Republic Steel Corp. on Sept. 1, 1930.

C. M. White first became associated with the steel industry in 1913, as a machinist helper with American Bridge Co., Ambridge. He then became millwright helper in the sintering plant and two years later was made plant superintendent of Jones & Laughlin Steel Corp. At the end of two years he was made assistant blast furnace superintendent of the Eliza works, then master mechanic in charge of construction maintenance and power. He next went to the company's South Side works as assistant to the general superintendent.

He went into the railroad business for a few years as general superintendent of the Jones & Laughlin subsidiary railroads in Pittsburgh and Aliquippa.

In 1927 Mr. White was appointed assistant general superintendent of the Aliquippa works and two years later was made general superintendent.

In 1930 he went with Republic as assistant vice-president in charge of



CHARLES M. WHITE

operations and was made vice-president in charge of operations in 1935, which position he still retains.

♦ ♦ ♦

R. J. KNERR, who has been superintendent of maintenance of Lehigh mills of Bethlehem Steel Co., Bethlehem, Pa., since 1934, has been appointed superintendent of the Lehigh mills, succeeding ARTHUR C. CUSICK, who has resigned to become general superintendent of the Crucible Steel Co. of America. Mr. Knerr received his M.E. degree from Lehigh in 1920 and upon graduation was assigned to the combustion department of Bethlehem, where he remained for 14 years, for part of the time as assistant combustion engineer.

L. J. BRAY, who has been general foreman of the locomotive repair shop for the past seven years, becomes superintendent of maintenance of Lehigh mills. He also is a graduate of Lehigh University and joined Bethlehem in 1923. After two years in the drawing room, he was made foreman of the cinder dump and later of the power house.

A. W. CHENOWETH, who has been assistant superintendent of Lehigh finishing mills, has been promoted to the superintendency of these mills. He received his B.S. from Lehigh University in 1917 and two years later joined Bethlehem, where he served in the alloy finishing mills, becoming general foreman of these mills in 1923. He was made assistant superintendent of the finishing mills in 1936.

HENRY I. MAURER, assistant superintendent of the 35 and 18-in. mills and billet preparation, has been made superintendent of these departments. He went to Bethlehem from the Steelton plant in 1919 and worked in the accounting department until 1924, when he was made foreman of the 22-in. mill. He was subsequently made foreman of a number of departments and was appointed to the assistant superintendency in 1936.

H. L. GIFFORD, since 1936 assistant

superintendent of the heating and cold drawn departments, has been appointed superintendent of these departments. He received his technical training at Carnegie Institute of Technology and went to Bethlehem from the Pittsburgh plant of the Crucible Steel Co. of America in 1927.

E. F. MARTIN, heretofore superintendent of the Grey mills at Saucon, has been made assistant superintendent of that plant. He joined the Bethlehem company in 1922 upon

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Most highly stabilized Chlorinated Solvent you can buy—that's Perm-A-Clor.

Its price is slightly higher than ordinary solvents, but its value to you is much greater, because Perm-A-Clor gives you higher

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Send information and prices covering your solvents, including Perm-A-Clor. We would like to discuss (without obligation) our Metal Cleaning Problem with one of your experienced engineers.

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DETROIT REX PRODUCTS CO.
Engineered Solvent Degreasing and Alkali Cleaning

graduation from Stevens Institute of Technology. After acting as foreman of a number of mills, he was made superintendent of the Grey mills in 1928.

C. A. MCGILL, has been promoted to the superintendency of the shape mills from the assistant superintendency. He became identified with Bethlehem in 1926 after graduation from Clemson Agricultural and Mechanical College.

FRED C. CRAWFORD, president, Thompson Products, Inc., Cleveland, has been elected president of the Cleveland Chamber of Commerce. CHARLES J. STILWELL, vice-president, Warner & Swasey Co., Cleveland, was chosen first vice-president. New Directors elected include C. F. HOOD, president, American Steel & Wire Co.

♦ ♦ ♦

WALTER F. MUNFORD has been appointed assistant to vice-president in



W. F. MUNFORD

**THE NEW IMPROVED OILGEAR
HORIZONTAL BROACHING MACHINES**



**Outstanding
in DESIGN, CONTROL
and PERFORMANCE**

Ever since Oilgear pioneered the hydraulic broaching machine, it has led the way with a constant advance of outstanding developments both in fluid power and machine design.

Illustrated above is one such improvement. Already in the plants of leading industries, the new Oilgear Horizontal Broaching Machines are providing increased production, at lower costs, with much less tool breakage and far longer tool life.

These machines provide variable cutting speeds up to 37 feet per minute and independently adjustable return speeds up to 100 feet per minute. They provide the most modern simplified push-button control, resulting in easier operation and less fatigue to the operator. Alternate to that, a toe lever switch frees the operator's hands for the work and the tool. In addition there is protection against overload and conven-

ient emergency stop button. There is ample space for performing both internal and external broaching operations. Oilgear "DX" two-way variable displacement pumps with double solenoid pilot controls supply cushioned fluid power. All hand and foot levers, links, springs, pins, etc. required in previous control devices have been eliminated.

Oilgear Horizontal Broaching Machines are available in 9 sizes from 6000 to 100,000 lbs. normal broaching capacity; from 36" to 72" broaching stroke. 150% overload capacity increases the range from 9000 to 150,000 lbs. peak tool capacity.

In every way the new Horizontal Broaching Machines are characteristic of the advances in design and performance which have always made Oilgear the preferred equipment in leading plants. Write for further specifications. THE OILGEAR COMPANY, 1303 W. Bruce St., Milwaukee, Wisconsin.

OILGEAR
BROACHING MACHINES AND PRESSES

charge of operations at the main office of American Steel & Wire Co., Cleveland, having previously been superintendent of the company's Cuyahoga works, Cleveland.

Mr. Munford was born in Worcester, Mass., where he attended Worcester Polytechnic Institute. Later he matriculated at Massachusetts Institute of Technology. Mr. Munford's first position with American Steel & Wire Co. was during his summer vacation in 1919. Upon leaving school he became a helper in the open-hearth department in Worcester. Following this came two other positions before he became superintendent of the open hearth in 1927. In 1930 he was transferred to Cleveland as superintendent of the open hearth at the company's Newburgh works. When this division was dismantled in 1933 he was transferred to National Tube Co. at Lorain as assistant superintendent of the steel works. He became assistant superintendent at the company's Cuyahoga works in Cleveland in 1934 and superintendent in January, 1937, which position he has held until his appointment as assistant to vice-president, effective April 15, 1939.

H. L. JENTER becomes general superintendent of that works, while J. D. BASTER becomes superintendent of the cold rolled mills. A. G. MONTGOMERY is appointed superintendent of the hot mills and V. H. LEICHLITER becomes wire mill superintendent. Mr. Jenter and Mr. Montgomery have been assistant superintendents at Cuyahoga, which positions have been abolished.



H. L. BERNØ

while Mr. Leichter was formerly assistant superintendent at Newburgh wire works in Cleveland and Mr. Baster was assistant superintendent of the North works at Worcester, Mass.

At Worcester, H. R. RICE succeeds Mr. Baster and G. E. HANSEN becomes foreman of the spring mill at South works in place of Mr. Rice.

HARRY L. BERNØ has been made president of the W. H. Davey Steel Co., Cleveland. WILLIAM H. DAVEY, company founder, continues as chairman and treasurer. HAROLD DAVEY, in charge of Detroit sales, has been made vice-president, succeeding Mr. Berno in that position. R. S. EASTERDAY continues as secretary. Mr. Berno, following graduation from Ohio Wesleyan University, was connected with Westinghouse Electric & Mfg. Co. at Mansfield, Ohio, prior to entering the Davey firm about five years ago.

HUGH MORROW, president, Sloss-Sheffield Steel & Iron Co., Birmingham, will tell how private capital in the South is rehabilitating itself in an address April 20 before the Economic Club of Chicago, at the Palmer House. Mr. Morrow's subject will be "The South—Economic Problem No. 1."

EUGENE D. HOPPER, associated with the automobile industry in Youngstown, has been elected a director of the Aetna-Standard Engineering Co., Youngstown.

A. N. SNYDER, of the Wohler Corp., Lansing, has been named president of the Purchasing Agents Association of Central Michigan.

HERMAN A. WAGNER, one of the founders and for many years president of the Wisconsin Bridge & Iron Co., Milwaukee, has retired from active participation in the business, but remains a director. He is succeeded as president by A. L. RIEMER, formerly

vice-president and general manager, who started with the firm 29 years ago as a clerk. J. A. SCHOENECKER, formerly secretary, and A. E. WALLING, in charge of the company's branch office in Chicago, have been elected vice-presidents, and E. F. BARKOW has been elected secretary.

WALTER W. PATCHELL has been appointed general superintendent, Lake division, Pennsylvania Railroad, with



Protect Your Workers with MORTON'S SALT TABLETS

Heat-Fag is real — an unseen but powerful force that rides every hot wave . . . a force that costs industry thousands of dollars each year. For, hot days and heavy work make men sweat — and, unless the salt that's sweated out of their bodies is replaced, Heat-Fag takes its toll, production sags and profits suffer. This fact is known by medical men everywhere and by safety directors, executives and plant superintendents.

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Place Morton's Salt Tablet Dispensers at drinking fountains. These modern, sanitary dispensers represent the most efficient and economical way to provide workers with salt. A single push of the lever dispenses one tablet at a time.

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They are easy to take — dissolve quickly. Only the purest and most highly refined salt is used.

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Install Morton's Dispensers and Salt Tablets in your plant now. Place your order today. Remember — a small investment now will pay big dividends in Heat-Fag protection. Shipment will be made promptly — prepaid.

Write for folder — "Heat-Fag"



MORTON SALT COMPANY CHICAGO, ILLINOIS

headquarters at Cleveland. He succeeds T. C. HERBERT, who has been granted a leave of absence because of ill health.

♦ ♦ ♦

V. H. LAWRENCE, formerly metallurgical engineer of the Alan Wood Steel Co., Conshohocken, Pa., has been made assistant to the vice-president. He is being succeeded as metallurgical engineer by L. E. EKHOLOM. W. A. ERICKSEN, has been made open-hearth superintendent, succeeding A. F.

FRANZ, who is now superintendent of the steel division. P. C. MAYFIELD has replaced I. F. WOLFGAM as coke plant superintendent, and the latter has been appointed superintendent of the coke plant and blast furnaces. W. B. HAUS is blooming mill superintendent.

♦ ♦ ♦

C. R. MACBRIDE, who has been identified with the Boston sales office of the A. M. Byers Co., Pittsburgh, has been appointed manager of the

engineering service department. He was formerly with the Edgewater Steel Co.

♦ ♦ ♦

A. J. AULERICH, for the past four years with the Detroit sales and service division of the Progressive Welder Co., Detroit, has been transferred to the Dayton, Ohio, office, to handle sales in Ohio and Indiana.

♦ ♦ ♦

BYRON L. ASHDOWN has been made representative in Missouri, Kansas and part of Illinois for the C. M. Kemp Mfg. Co. He will make his headquarters in the Syndicate Trust Building, St. Louis.

♦ ♦ ♦

HENRY JUDE, who has been associated with Manning, Maxwell & Moore, Inc., for the past 33 years, has been made general sales manager of the locomotive equipment division, succeeding C. H. BUTTERFIELD, who was recently made vice-president in charge of sales of the industrial and locomotive divisions. Mr. Jude joined the company as an office boy in 1905 and through various promotions was made assistant general sales manager in 1934 of the division he now heads.

♦ ♦ ♦

JAMES S. LATUCKY has been made sales and advertising manager of the Gilman Engineering Works, Janesville, Wis.

♦ ♦ ♦

GUS WICKSTROM, chief clerk since 1930 in the purchasing department of the Union Pacific Railroad, has been promoted to assistant general purchasing agent. He joined the Union Pacific in 1915, starting in the engineering department.

♦ ♦ ♦

FLOYD M. ERLNMEYER, who has served the Maas & Waldstein Co. in western New York for the past two years, has been transferred to the southern New York territory. He will make his headquarters in New York City.

♦ ♦ ♦

VERNON WHITING, of Dallas, Tex., has been made sales representative in northern Texas by the Stearns Magnetic Mfg. Co., Milwaukee.

♦ ♦ ♦

FRANK B. CONLON, heretofore with the Airtemp Corp., Dayton, has joined the sales organization of Sheffer-Gross Co., Philadelphia. He was formerly with the engineering department of the Pennsylvania Railroad.

NEW POWER TO CUT COSTS

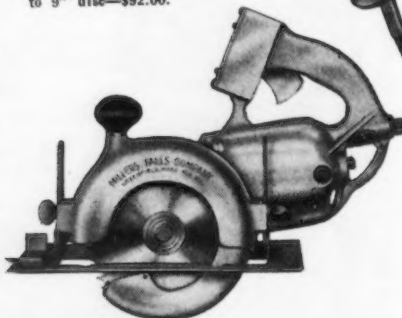
Production going up . . . sales going up . . . but be sure your costs don't go up disproportionately. To keep your costs down, Millers Falls is constantly developing improvements and additions to its already fine line of electric tools. Recent changes demand your attention. Ask your distributor, or write us direct, to arrange a free trial on your own work of any of the Millers Falls drills, screw drivers, nut runners, hammers, saws, sanders or grinders. Write for Catalog 38.



No. 3216A—Electric Hammer
Improved design, new low price. Unique principle—only one moving part. Steel hammer head striking 3600 powerful blows per minute. Complete with chucks—\$225.00. Others down to \$80.00.



No. 707B—Portable Electric Sander
For sanding, metal finishing, grinding, cleaning; shock absorbing spindle for smooth operation. 7" disc—4200 R.P.M. Price—\$39.50. Others to 9" disc—\$92.00.



No. 250—Portable Electric Saw
Fully enclosed top guard, telescope bottom guard with automatic return, insuring maximum safety. Straight cut—2": 3750 R.P.M. New low price—\$85.00. Others to 4 1/4" straight cut—\$225.00.

MILLERS FALLS COMPANY GREENFIELD . . . MASS. . .

... OBITUARY ...

PHILIP E. BLISS, president, Warner & Swasey Co., Cleveland, since 1928, died unexpectedly on April 11, in St. Luke's Hospital, Cleveland, at the age of 53. Following an active week he had entered the hospital over the weekend for treatment of a heart ailment.

Mr. Bliss was a past president of the National Machine Tool Builders Association and was widely known throughout the nation.

A native of Cleveland, he attended the public schools in North Fairfield,

his company of the 82-in. reflecting telescope which early in May is to be dedicated at the University of Texas' McDonald Observatory, located atop Mt. Locke in western Texas.

Typical of Mr. Bliss' genuine interest as a chief executive in the welfare of his employees was the removal several years ago of the door to his private office—to provide the maximum possible encouragement to his men to come to him with their problems.

He was broadly interested in educational and philanthropic activities.

He was a member of the executive committee of the National Industrial Conference Board and belonged to the American Society of Mechanical Engineers, the Army Ordnance Association, the Cleveland Engineering Society and a host of business and civic organizations. He was a member of the Union Club of Cleveland, the Union League Club of New York, and Phi Delta Theta fraternity, and was a trustee of Case School of Applied Science, Cleveland.

Honorary pallbearers for Mr. Bliss



PHILIP E. BLISS

Ohio, where his father was a well-to-do farmer, and concluded his education at Ohio Wesleyan University. He spent the next four and one-half years in Y.M.C.A. work in Cleveland as a junior secretary and a year and a half in a similar capacity in New York City before returning to Cleveland to enter the employ of the Warner & Swasey Co. in 1910 as a junior clerk in the accounting department.

From that first position Mr. Bliss advanced to auditor, later became the company's treasurer. In 1924 he was made a vice-president, and in 1928 succeeded Col. Frank A. Scott as president. Soon the task of guiding the company through the difficult business period fell upon his shoulders.

Quiet and self-effacing, yet recognized as one of the country's leaders in the machine tool industry, Mr. Bliss had just witnessed the completion by

EC&M NEO-TIME CONTROL

A new, simple, flexible method of timing

Provides
Definite Time ranging
from a few seconds up
to several minutes



Replaces Limit Switches on Blast Furnace Distributor-Top

The extreme accuracy of EC&M NEO-TIME Control makes it suitable for many industrial timing problems. It is operated directly from the source of power and its operation is not dependent upon any delicate working parts or elements which are subject to variation due to temperature change or adverse atmospheric conditions.

The illustration above shows one of several of these NEO-TIME Controls used in place of Limit Switches to control a Blast Furnace Distributor-Top Motor. Instead of being mounted at the top of the furnace, these units are usually mounted in the skip-house or scale car operator's station at ground level. In all cases, the NEO-TIME method of operation not only has proven very satisfactory but also, much superior to the use of limit switches mounted at the top of the furnace.

Submit your timing problems for solution by EC&M NEO-TIME Control. Fill out and mail today the convenient coupon below.



HEAVY DUTY MOTOR CONTROL
FOR CRANES, MILL DRIVES AND
MACHINERY • BRAKES • LIMIT
STOPS • LIFTING MAGNETS AND
AUTOMATIC WELD TIMERS

THE ELECTRIC CONTROLLER & MFG. CO.
2688-A East 79th St., CLEVELAND, OHIO

Gentlemen:

Please send me further information on NEO-TIME Control for a problem requiring about
(secs./mins.)

Name

Company

Address

HOLD DOWN MARKING COSTS with CUNNINGHAM SAFETY STEEL STAMPS & HOLDERS



Cunningham Safety Steel Stamps and Holders are manufactured from the world's strongest commercially-made tool steel. They will reduce your stamping costs, and at the same time will keep your workmen safer.

The stamps illustrated are guaranteed against mushrooming and spalling. They are 25% lighter and 50% stronger than other stamps, and they will give you

100% more service than ordinary steel stamps.

The patented Wedge-Grip design permits deeper marking with less exertion on the part of the operator, and protects fingers from foul hammer blows.

Write for complete information about these and other Cunningham marking devices.

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INDUSTRIAL PERFORATIONS include round, square and special shaped perforations as used in mechanical arts. Our line is comprehensive.

ORNAMENTAL PERFORATIONS as used in architectural grilles, metal furniture, enclosures, cabinets, stoves and for ornamentation. Many attractive and exclusive patterns.

H & K workmanship is unsurpassed.

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Any Perforation

The Harrington & King PERFORATING Co.

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included: Dr. Virgil Jordan, president, National Industrial Conference Board of New York; B. B. Williams, president, Cooper-Bessemer Co., Mount Vernon, Ohio; Ernst R. Behrend, president Hammermill Bond Paper Co.; Wendell E. Whipp, president, National Machine Tool Builders Association; Ralph E. Flanders, president, Jones & Lamson Machine Co., Springfield, Vt.; Henry S. Sherman, president Society for Savings Bank; Harris Creech, president, Cleveland Trust Co.; Thomas W. Jones, attorney; Dr. William E. Wickenden, president, Case School of Applied Science; A. C. Ernst, president, Cleveland Chamber of Commerce; H. H. Johnson, attorney, and Frank A. Quail, attorney.

♦ ♦ ♦

WILLIAM P. MCFARLANE, secretary and treasurer of the Murray Body Co. until his retirement 15 years ago, died April 14 at Bald Eagle Lake near Pontiac, Mich. Born in Romeo, Mich., in 1864, Mr. McFarlane lived for some years in Port Huron, Mich., where he became connected with the Anderson Carriage Co. The firm later moved to Detroit and, with the coming of the automobile, it became the Detroit Electric Automobile Co. with Mr. McFarlane as plant superintendent.

♦ ♦ ♦

DON KENYON BRIDGES, who died April 13 at his home in Bay City, Mich., was head of the planning department of the Bay Mfg. Co. Mr. Bridges would have been 45 years old April 15.

♦ ♦ ♦

JOHN G. OLIVER, chairman of the board of Bardons & Oliver Inc., Cleveland machine tool manufacturer, died April 14 at his home at the age of 77. He had been in poor health during the past year.

Mr. Oliver, co-founder of the firm and widely known throughout his industry, also was president at his death of Joseph Dyson & Sons, Inc., Cleveland forging manufacturer. He was president of Bardons & Oliver until January of this year when his son, Lockwood, assumed the duties.

He was born Oct. 7, 1861, in Worcester, Mass., and was educated at Worcester Polytechnic Institute, where he received his bachelor of science degree in 1882. He went to Cleveland in the fall of that year and soon secured work at the Warner & Swasey Co., which had been founded only a few years earlier. Mr. Oliver became head of the drafting room and in that capacity drew the plans for the famous Lick telescope at the Lick observatory in California.

In 1891 he and George C. Bardons, a superintendent at Warner & Swasey

Co., founded Bardons & Oliver. Their company acquired Joseph Dyson & Sons Forge Shop in 1898.

♦ ♦ ♦

ARTHUR C. SWALLOW, Sr., founder and president of the Motor Castings Co., Milwaukee, and identified with other Milwaukee industries, died on April 11, aged 68 years. He was born in Whitewater, Wis., but had lived in Milwaukee since boyhood.

♦ ♦ ♦

ROBERT M. RUBUSH, Sr., metallurgist, Machined Steel Casting Co., Alliance, Ohio, for many years, died April 7 at the age of 47.

♦ ♦ ♦

EDWARD B. STICKLEY, 62 years old, was buried in Urbana, Ohio, on April 14. Mr. Stickley, who had lived in Detroit for the last 30 years, owned and operated the E. B. Stickley Machinery Co. for 25 years. Previously he had been superintendent of the Gray Motor Co. and master mechanic at the Hudson Motor Car Co. He retired several years ago.

♦ ♦ ♦

H. A. LARSEN, since 1934 manager of the Pacific Coast district for Wickwire Spencer Steel Co., New York, died recently at the age of 54.

♦ ♦ ♦

WALTER BROMLEY, who had been identified with the American Screw Co. for the past 40 years, died on March 3. He had been assistant sales manager since 1937, having been engaged in sales work in various parts of the country since 1908.

♦ ♦ ♦

EDWARD GRAY, once chief engineer of the Ford Motor Co., later an independent designer and real estate man, died April 2 in a Detroit hospital. He was 66 years of age.

♦ ♦ ♦

CYRIL A. SCHMIDT, manufacturers' representative in Flint, Mich., was buried April 5. Mr. Schmidt was born in Grand Rapids 36 years ago and graduated in 1926 from the University of Michigan Engineering School. He was employed at the Buick Motor Co. until five years ago.

Wheeling's Galvanizing Units Start Production

STEUBENVILLE, OHIO—The Wheeling Steel Corp. last week started production on its four new sheet galvanizing units here, one pot being now in operation with the remainder to follow in the near future. Rated capacity of the new equipment approximates 6000 tons of sheets a month.

B-G-R COMES THROUGH » » » for the small user of SPRINGS



You don't have to be a quantity user of springs to get service and satisfaction at B-G-R. Versatile small order departments are ideally equipped for experimental springs, breakdown emergencies, or any small lot from one spring to several hundred. Two plants give unusual facilities for production in any amount.

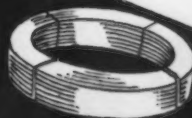
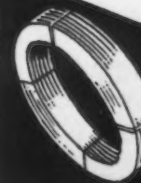
Try B-G-R service...whatever the size of your order

BARNES-GIBSON-RAYMOND

DETROIT PLANT DIVISION OF ASSOCIATED SPRING CORP. COOK PLANT
DETROIT, MICHIGAN ← TWO PLANTS → ANN ARBOR, MICHIGAN

KONIK

Konik is a patented steel containing copper, nickel and chromium. Mfg. under U.S. Patent No. 1874814



QUESTIONS AND ANSWERS FOR ENGINEERING AND PRODUCTION DEPARTMENTS

- Q. What difference is there between Konik and ordinary Carbon Steel?
- A. Konik is a special steel containing copper, nickel and chromium for greater strength, rust resistance, and better hardening qualities.
- Q. Does Konik carburize faster and deeper than ordinary carbon steel?
- A. Yes. The chromium in Konik forms carbides which increase the speed and amount of carbon absorption.
- Q. Why is it a superior material for many applications where ordinary steel is now used?
- A. Because you get a deeper case in less time and the hardening is more uniform and more dependable.
- Q. How about cost?
- A. The cost is practically the same.

OPEN HEARTH STEEL PRODUCTS

WIRE • Bright Basic, Annealed, KONIK, Special Manufacturers, Nails, Barb Wire, Fence.

SHEETS • Black, Galvanized, Roofing & Siding.

CONTINENTAL

CONTINENTAL STEEL CORPORATION

KOKOMO, INDIANA

Plants at Kokomo, Indianapolis, Canton

J. & L. Expands Tests For Pipe Defects

A RECENTLY developed instrument the Tube-wall-scope, and a new application of the Magnaflux method are now being used by Jones & Laughlin Steel Corp., Pittsburgh, to inspect, during production, both the interior and exterior surfaces of seamless steel integral joint drill pipe.

The Tube-wall-scope is a precision instrument resembling an exceptionally long telescope. It is equipped with an adjustable focus eyepiece at one end and a series of special lenses, reflectors and a specially designed high-powered light at the other. The lenses are arranged to permit the operator to inspect the complete 360 deg. of circumference inside any tubular product as the Tube-wall-scope is pushed slowly through the pipe. Guide baskets mounted on the barrel serve to center the instrument in the pipe.

As the Tube-wall-scope magnifies the size of the image of a defect, an experienced inspector can quickly recognize any flaws as a possible source

of failure and by calibrations on the instrument barrel can then readily determine the location of a defect.

Every length of integral joint drill pipe now being produced by Jones & Laughlin is also subjected to the Magnaflux test, applied to the exterior of the forged upset to detect defects not visible to the eye in the desire to attain a perfection of surface that will materially reduce the possibility of failures at the joint. This test consists of placing the pipe in a magnetic field and then sprinkling the pipe with a metallic powder or solution. Even though not otherwise visible, any defect will immediately become apparent as the red powder is attracted by magnetic action to a flaw and collects there.

Society for Metals Buys National Headquarters

CLEVELAND — A three-story stone house on Euclid Avenue has been purchased by the American Society for Metals to be used as national headquarters by the organiza-

tion. It was constructed by the late D. Z. Norton, banker and co-founder of Oglebay, Norton & Co., in 1898. It contains 24 rooms.

Vascoloy-Ramet Corp. Opens Eastern Plant

A NEW plant for the manufacture of tantalum carbide wire, tube, sectional and shape dies, cutting tools and blanks, has just been put into operation by Vascoloy-Ramet Corp., North Chicago, Ill.

The plant, located at 415-421 Tonelle Avenue, Jersey City, N. J. occupies a one-story brick and steel building of approximately 6000 sq. ft. floor space.

Except for the primary processing of carbide materials which are received from the parent plant at North Chicago, the New Jersey plant is a complete production unit for Vascoloy-Ramet products, equipped with new and advanced facilities for manufacturing, casing, finishing and recutting all types of sintered carbide dies. Equipment is also to be installed for production, brazing and finishing of blanks and cutting tools.

Operations are under the direction of John Kontra, Joseph Hall and John Adler, who were formerly associated with Union Wire Die Co. District sales and service are handled by Hayden G. Fulton, transferred from North Chicago, main plant.

"Steel Horizons" Issued By Allegheny Ludlum

"STEEL HORIZONS," new house organ of Allegheny Ludlum Steel Corp., Pittsburgh, is now being distributed to interested executives. Printed in color, and containing many striking illustrations, the publication carries articles on the discovery, development and commercial aspect of stainless, and the role it will play at the World's Fair. Use of stainless for fittings, kitchenware, automobile parts, industrial equipment, etc., is discussed. Copies may be obtained from the corporation.

Licensing agreements involving the Phillips recessed head screw have been made between American Screw Co. of Providence, R. I., and Chandler Products Co. of Euclid, Ohio, Scovill Mfg. Co. of Waterbury, Conn., Pheoll Mfg. Co., Chicago, and Lamson & Sessions Co. of Cleveland.

You Can Depend On
"HERCULES"* (Red-Strand) Wire Rope...

There is no guesswork when you use "HERCULES" (Red-Strand) Wire Rope. It is designed and built to do specific jobs better . . . safer . . . more economically. Furnished in a wide variety of constructions so as to be suitable for all purposes—each backed by 81 years of manufacturing experience and close co-operation with users.

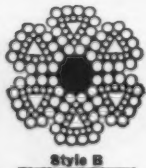
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For maximum efficiency in Preformed Wire Rope, use Preformed "HERCULES". It is available in both Round Strand and Flattened Strand constructions

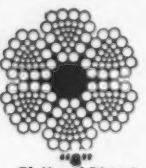
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A. LESCHEN & SONS ROPE CO.
 Established 1857
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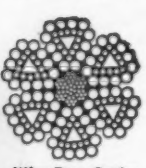
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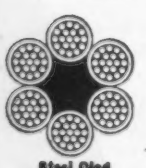
Style B
Flattened Strand



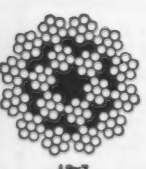
"A"
Flattened Strand



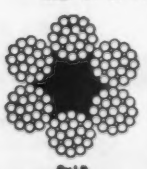
Wire Rope Center



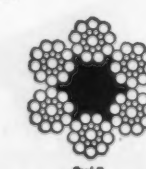
Steel Clad



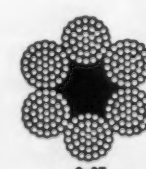
18x7
Non-Rotating



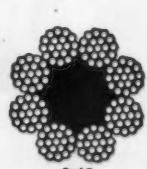
6x19
Filler Wire



8x19
Scale



6x37
Extra Flexible



8x19
Extra Flexible

CAST IRON PIPE

Brookline, Mass., will close bids April 21 on 360 tons of 6 to 12 in. pipe.

Andover, Mass., has awarded its pipe requirements for 1939 to Warren Foundry & Pipe Corp.

Concord, N. H., has awarded 5000 ft. of 6-in. pipe and 3000 ft. of 8-in. to R. D. Wood & Co.

Treasury Department, Procurement Office, Boston, has awarded 5550 ft. of 6-in. pipe for Woburn, Mass., to Warren Foundry & Pipe Corp.

Windfall (Tipton County), Ind., will ask bids soon for 6, 8 and 10-in. pipe for water system; also for 60,000-gal. elevated steel tank and tower, one 200-gal. per min. motor-driven pumping unit and accessories, and other waterworks equipment. M. L. Burden, Alexandria, Ind., is consulting engineer.

Dorchester, Wis., has approved bond issue of \$30,000 for pipe lines for water system and other waterworks installation, including 13,000 ft. of 6-in., and 2432 ft. of 8-in. pipe; hydrants, water meters, pumping machinery and other equipment. Proposed to begin work soon. Frank J. Davy & Son, 502 Main Street, LaCrosse, Wis., are consulting engineers.

Ohio Cities Water Co., Tiffin, Ohio, plans pipe line extensions in water system and other waterworks installation. Cost close to \$50,000. Work is scheduled to begin soon.

Water Supply District No. 4, near Greenwood, Jackson County, Mo., now being organized, care of Charles V. Garnett, Grand Avenue Temple Building, Kansas City, Mo., attorney and representative, plans pipe lines for water system in newly created district. Cost about \$40,000.

Albuquerque, N. M., has authorized immediate call for bids for about 14,100 ft. of various sized pipe for extensions in water system. Charles E. Wells is city manager.

Springfield, Ohio, plans call for bids, closing on or about June 16, for pipe line extensions and replacements in water system, and other waterworks installation. Cost over \$1,000,000. Financing has been arranged through Federal aid.

City Council and Marietta County Commissioners, Marietta, Ga., plan pipe lines for water system in district between city limits and Chattahoochee River, which will be used as source of supply. Project will include pumping station, water filtration plant and other waterworks installation. Cost about \$140,000, of which \$80,000 will represent a bond issue and remainder secured through Federal aid.

Board of Jackson County Supervisors, Pascagoula, Miss., asks bids until May 1 for 8, 6 and 4-in.; for water system; also for 150,000-gal. steel storage tank, 750-gal. per min. motor-driven pumping unit and auxiliary equipment. L. C. Winterton, Pascagoula, is consulting engineer.

Pardeeville, Wis., closes bids April 27 for pipe for water system; also for pumping machinery and accessories, water-softening equipment and water meters. General Engineering Co., City Bank Building, Portage, Wis., is consulting engineer.

Lowry, Minn., asks bids until May 1 for pipe lines for water system and other waterworks equipment, including elevated tank and tower, deep-well turbine pumping unit and accessories. E. P. Schaub, Glenwood, Minn., is engineer.

Oceanside, Cal., Mission Valley pipe line, involving 12, 14, 16 and 18-in. pipe, tonnage unstated, has been awarded to Carroll & Foster, San Diego, Cal., who will purchase pipe from United States Pipe & Foundry Co., San Francisco.

Kettle Falls, Wash., asks bids April 20 on 215 tons of 2, 3, 4, 6 and 8-in. pipe and fittings.

Westport, Wash., has passed bond issue for construction of seven-mile pipe line and 10,000 ft. of mains. W. C. Morse, Seattle, is consulting engineer.

... PIPE LINES ...

Standard Oil Co. of Louisiana, Continental Bank Building, Shreveport, La., plans new welded steel pipe line from Magnolia, Buckner and Village oil field districts, Columbia County, Ark., to Haynesville, La., about 35 miles, for crude oil transmission. Connection will be made at latter place with main oil transmission lines of company to Eldorado and Shreveport. Cost over \$250,000 with booster pumping station and other operating facilities.

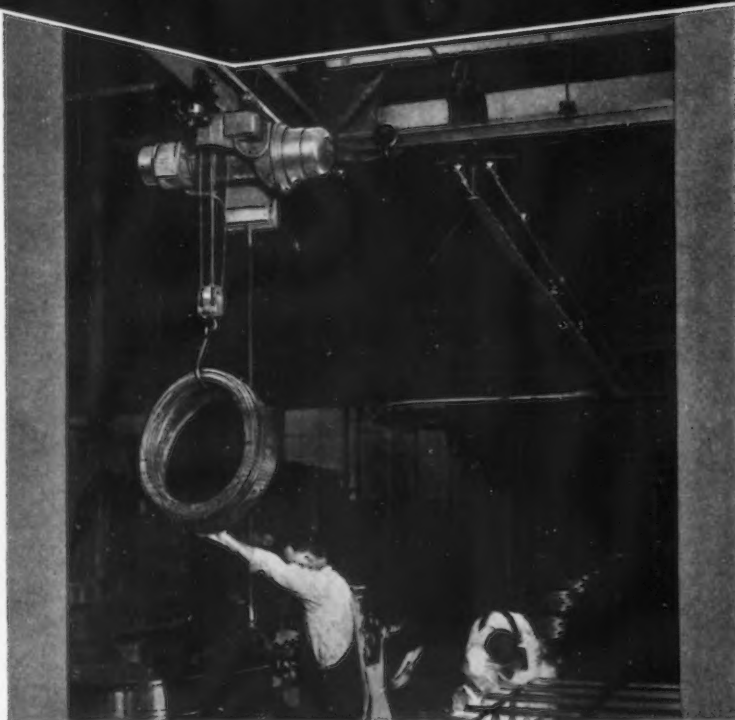
Humble Pipe Line Co., Humble Building, Houston, Tex., an interest of Humble Oil & Refining Co., same address, plans new welded steel pipe line, about 4-in., from Woodson oil

field, Throckmorton County, Tex., to point near Albany, Tex., about 25 miles, for crude oil transmission. Connection will be made at latter point with main pumping station of company. Cost close to \$150,000 with booster plants and other operating facilities.

Socony-Vacuum Oil Co., Casper, Wyo., plans new 4-in. welded steel pipe line from Big Muddy oil field, Wyo., to Casper, about 13 miles, for crude oil transmission to company plant at latter place. Main offices are at 26 Broadway, New York.

Peoples Gas & Electric Co., Mason City, Iowa, plans steel pipe lines to Ventura, Manly and Clear Lake, Iowa, for natural gas transmission to these communities, where service will be furnished in future. Cost close to

P&H HEVI-LIFT HOISTS



GET SPEED AND LOWER COST WITH "THRU-THE-AIR" HANDLING

Off the floor! . . . out of the aisles! . . . "thru the air" handling give you swift, effortless movement of loads — saves money, saves man power, saves time. P&H hoist engineers will gladly recommend the most practical material handling methods for your individual needs. Why not investigate? Or ask us to send your copy of Bulletin H-5? The Harnischfeger Corporation, 4401 W. National Ave., Milwaukee, Wisconsin.

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HOISTS • WELDING ELECTRODES • MOTORS • EXCAVATORS • ELECTRIC CRANES • ARC WELDERS

\$135,000 with booster stations, control plants and other operating facilities.

Sinclair Prairie Pipe Line Co., Oklahoma City, Okla., plans early construction of new welded steel pipe line from K.M.A. oil field, near Wichita Falls, Tex., to point near Jacksboro, Jack County, Tex., for crude oil transmission. Connection will be made with main pipe line of company at latter place. New line will have a capacity of about 10,000 bbl. per day, with booster pumping stations and other operating facilities.

Prescott, Ariz., asks bids April 24 on 28,000 ft. of steel pipe for Goldwater Dam flow line.

Quemado, Tex., has approved plans for main pressure pipe line from town limits through Quemado Valley district to connection with pipe line system of Texas Gas Utilities Co., for natural gas supply for municipality. Cost reported close to \$50,000.

Central Nebraska Power and Irrigation District, Third and St. Joseph Streets, Hastings, Neb., George E. Johnson, chief engineer and general manager, closes bids April 28 for structures in connection with hydroelectric generating plant and irrigation system, including 5475 ft. of 78-in., 1558 ft. of 80-in., and 1758 ft. of 84-in. welded steel siphon pipe; also for 31 ft. of 48-in., 33 ft. of 36-in., and 36 ft. of 24-in. welded steel pipe; and 226 ft. of 90-in. No. 3 gage, and 74 ft. of 90-in. No. 5 gage multi-plate pipe (Group 32-G).

Dominion Steel Buys Open-hearth Furnaces

CLEVELAND—Arthur G. McKee Co., several weeks ago was awarded two 100-ton tilting furnaces by Dominion Steel & Coal Corp., Sydney, N. S., part of a general expansion program which has been under way for some time.

. . . CANADA . . .

. . . Large steel contracts expected from Britain.

TORONTO, April 18—Some improvement in business was noted in the Canadian iron and steel markets in the past week. The betterment was due to increased spot sales. Prospective orders indicate heavier buying for the next month with some 10,000 tons of structural steel overhanging the market. Current structural awards, however, continue in lots of 100 to 300 tons. Reinforcing bars and sheets are in good demand, with most of the orders going through jobbers. Builders hardware and automobile materials have shown improvement recently, but so far demand has not reached its expected peak. Demand for machinery and machine tools on replacement account has increased recently and good orders are appearing in the market at regular intervals. Steel mill interests in Eastern Canada report renewed interest in export demand for iron and steel, and it is understood that additional large contracts will be forthcoming soon from Great Britain for war supplies and various steel materials.

White House Clique Reactionary, Opposes Recovery, Weir Holds

THE White House clique, which President Roosevelt heads, does not want business recovery in the United States because its political power depends on continued Government spending, Ernest T. Weir, National Steel Corp. chairman, said this week.

"For all its professed great human objectives, its widely advertised interest in the welfare of the people, the fundamental concept of government held by the Administration is a throw-back," he said. "It is reaction against real democracy."

The question of how long it will be before recovery depends on how long the American people will tolerate the shaping of policies in the executive branch of government by a small group of left wingers, some of whom don't think the system of private initiative is worth saving, the National Steel executive declared at the annual dinner of the Weir-Cove Chamber of Commerce at Weirton, W. Va.

A 100 billion dollar national income would be possible in the United

States if the constant economic progress of the nation for 150 years had not been held up in the last decade, Mr. Weir said. Today, he added, the National Administration has destroyed the confidence of business men and has obstructed the new private investment that is essential to recovery, which itself would remove the need for any except normal government spending.

"In striking at private initiative, the present Administration," said Mr. Weir, "attacks the substance as well as the spirit of the American system of life. It attempts to start Americans back along the path of history to the very conditions of life from which their forefathers fled."

The United States, one of the last few strongholds of real democratic ideals and individual freedom, cannot halt the progress of autocracy by copying its methods but can demonstrate to the world it is possible for a nation to be both politically free and economically prosperous, Mr. Weir concluded.

CIO-AFL Feud Threatens Steel Plants With Coal Shortage

PITTSBURGH, April 18.—Prolongation of the impasse between United Mine Workers and soft coal operators for another two weeks would force major steel companies and other allied industries to take drastic coal conservation measures.

Although estimates from reliable industrial sources indicate that coal supplies in the steel industry will last from four to six weeks, it is believed that this picture will change sharply in the very near future should coal mines continue to be shut down. Some steel companies have cut production on their blast furnaces and Carnegie Illinois Steel Corp. has banked five blast furnaces within the past week as a protective measure.

All industrial coal above the ground has been earmarked and those industries which have or will soon run short, will be without fuel. Meanwhile, United Mine Workers have forced practically every non-union

mine in this district to shut down, and have gone so far as to close down stripper mines which do not employ regular miners but utilize shovel runners and truck driver. Pennsylvania state police have entered the picture in Fayette County in order to prevent tie-up of traffic which might result from miners demonstrations.

With no major wage or working conditions question blocking an agreement, some observers point out that John L. Lewis' request for a closed shop and elimination of strike penalties are demands which have little or nothing to do with either the operators or the consuming public, but are directly related to the feud between the CIO and the AFL.

Lake vessel operators who haul coal up the lakes after bringing iron ore down have been unable to satisfactorily establish schedules for the early navigation season due to the uncertainty created by the coal situation.

'38 Pig Iron Output Is 18,546,070 Tons

THE United States produced 18,546,070 gross tons of pig iron in 1938, compared with 36,129,586 tons in 1937 and 15,676,889 tons in 1934, the American Iron and Steel Institute announced this week. The institute reported 1938 production of ferroalloys at 614,791 tons, against 997,681 tons in 1937 and 461,684 tons in 1934.

Pig iron made for sale in 1938 totaled 2,954,924 tons of which 585,337 tons was basic; 151,685 tons bessemer and low phosphorus; 1,348,171 tons, foundry, and 869,731 tons, all other. Production of pig iron and ferroalloys in 1938 for sale and for makers' use included basic, 12,888,079 tons; bessemer and low phosphorus, 3,053,702 tons; foundry, 1,570,582 tons; malleable, 1,002,435 tons; forge or mill, 687 tons, and white and mottled, direct castings, etc., 30,585 tons, a total of 19,160,861 tons.

U. S. Shipbuilding Up In Lloyd's Figures

A DECREASE of 25 per cent in the building of merchant ships in Great Britain and Ireland, as compared with an increase of 40 per cent for the United States, is shown by a statement by Lloyd's Register of Shipping, covering returns for the quarter ended March 31. The returns include all merchant vessels of 100 gross tons each, and upward, being built in all the maritime countries except Russia.

For Great Britain and Ireland, the decline amounted to 182,000 gross tons of shipping. For the United States, a gain of 122,000 tons was reported and this country which, at the beginning of this year, stood fourth in the volume of ship production is now second, only 175,000 gross tons behind Great Britain and Ireland, whose lead at the beginning of the year was 481,000 tons.

For all countries combined, the production figures show a gain of 35,000 gross tons, or only slightly more than one per cent over the volume of building under way in the previous quarter. For Italy an increase of 55,000 tons was reported, and for Germany one of 25,000 tons; with smaller gains for Denmark and France. For Sweden there was a decline of 18,000 tons, with smaller decreases for Japan and Holland.



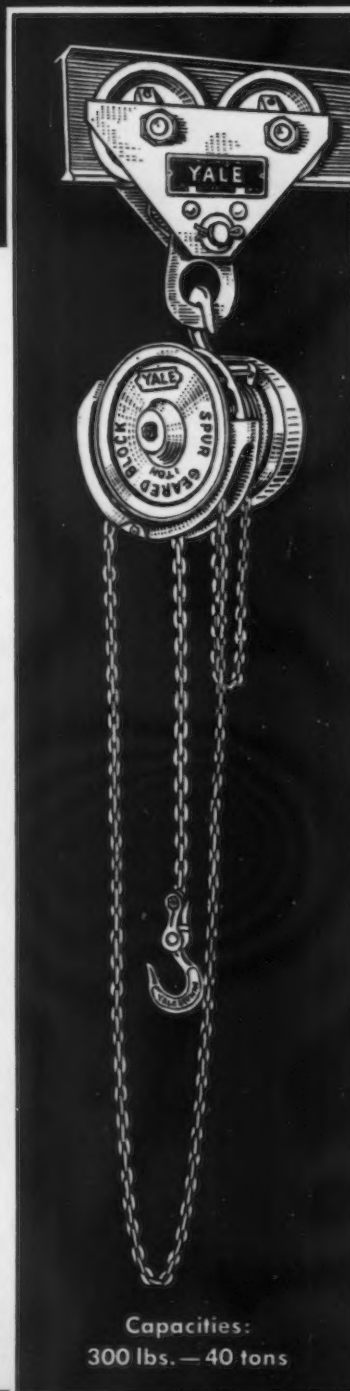
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Current Metal Working Activity

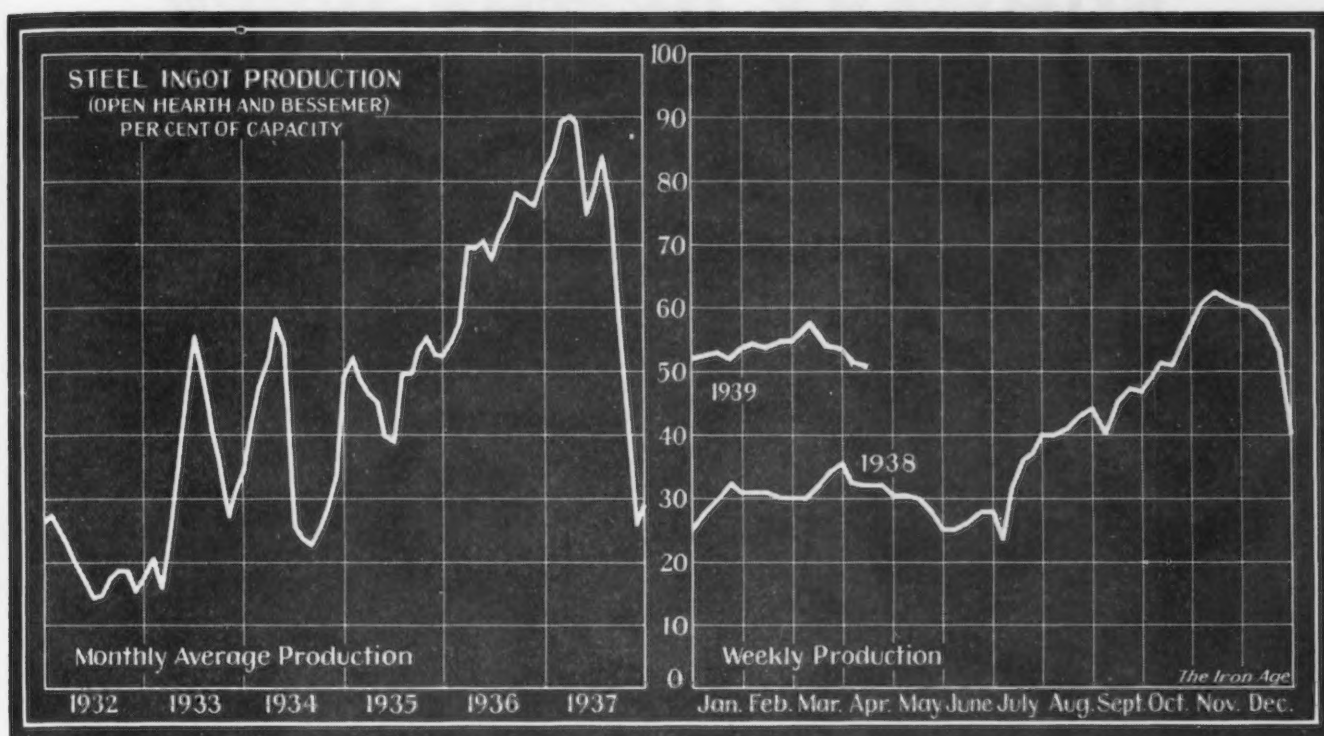
Latest Data Assembled by THE IRON AGE from Recognized Sources

	March 1938	February 1939	January 1939	February 1938	Two Months 1939	Two Months 1938
Steel Ingots: (gross tons)						
Monthly output ^a	3,364,877	2,954,883	3,186,834	1,703,245	6,141,717	3,435,511
Average weekly output ^a	759,566	738,721	719,376	425,811	728,550	407,534
Per cent of capacity ^a	55.63	54.10	52.69	31.74	53.36	30.37
Pig Iron: (gross tons)						
Monthly output ^b	2,407,058	2,060,187	2,175,423	1,298,268	4,235,610	2,727,353
Raw Materials:						
Coke output ^c (net tons)		3,148,754	3,444,256	2,598,186	6,593,010	5,477,760
Lake Ore consumed ^d (gross tons)		2,852,540	2,926,706	1,726,585	5,779,246	3,649,641
Castings: (net tons)						
Malleable, orders ^e		33,234	38,105	19,557	71,339	36,633
Steel, orders ^e		30,360	42,024	30,863	72,384	60,050
Finished Steel: (net tons)						
Trackwork shipments ^a	6,481	4,250	2,909	3,014	7,159	6,149
Fabricated shape orders ^f		77,036	101,559	57,144	178,595	137,464
Fabricated plate orders ^e		22,903	20,511	17,827	43,414	41,249
U. S. Steel Corp. shipments ^g	767,910	677,994	789,305	474,723	1,467,299	993,045
Fabricated Products:						
Automobile production ^h		317,200*	353,946	202,589	746,919	429,719
Steel furniture shipments ^h		\$1,813†	\$1,996†	\$1,849†	\$3,587†	\$3,846†
Steel boiler orders ^h (sq. ft.)		817†	1,120†	435,317	1,937†	936,920
Locomotives ordered ⁱ		3	8	17		26
Freight cars ordered ⁱ		2,004	3	109		134
Machine tool index ^j	185.4	167.1	150.8	75.7	154.8†	112.3†
Foundry equipment index ^k		135.3	122.3	90.4	133.3	94.0†
Non-Ferrous Metals: (net tons, U. S. only)						
Lead shipments ^l			40,189	30,135		65,058
Lead stocks ^l			117,214	138,134		
Zinc shipments ^m	45,291	39,723	42,526	22,097	82,249	47,028
Zinc stocks ^m	127,985	128,192	128,220	108,138		
Tin deliveries ⁿ (gross tons)	4,755	4,105	4,330	4,420	8,435	9,970
Refined copper deliveries ^o		51,377	54,827	32,282	106,204	62,987
Refined copper stocks ^o		308,958	301,110	326,244		
Exports: (gross tons)						
Total iron and steel ^p		359,690	362,672	460,640	722,362	1,046,934
All rolled and finished steel ^p		110,766	107,552	113,589	218,318	260,874
Semi-finished steel ^p		14,472	15,442	30,790	29,914	71,538
Scrap ^p		222,704	225,434	255,627	448,138	611,408
Imports: (gross tons)						
Total iron and steel ^p		19,149	27,664	19,589	46,813	49,220
Pig iron ^p		603	586	3,354	1,189	13,101
All rolled and finished steel ^p		10,738	18,026	14,276	28,764	31,956
British Production: (gross tons)						
Pig iron ^q	603,600	516,000	500,500	693,300	1,016,500	1,454,400
Steel Ingots ^q	1,170,900	971,100	811,700	1,057,600	1,782,800	2,139,000

† Three months' average. ‡ 000 omitted. * Preliminary.

Source of data: ^aAmerican Iron and Steel Institute; ^bTHE IRON AGE; ^cBureau of Mines; ^dLake Superior Iron Ore Association; ^eBureau of the Census; ^fAmerican Institute of Steel Construction; ^gUnited States Steel Corp.; ^hPreliminary figures from Ward's Automotive Reports—Final figures from Bureau of the Census, U. S. and Canada; ⁱRailway Age; ^jNational Machine Tool Builders Association; ^kFoundry Equipment Manufacturers Association; ^lAmerican Bureau of Metal Statistics; ^mAmerican Zinc Institute; ⁿNew York Commodity Exchange; ^oCopper Institute; ^pDepartment of Commerce; ^qBritish Iron and Steel Federation.

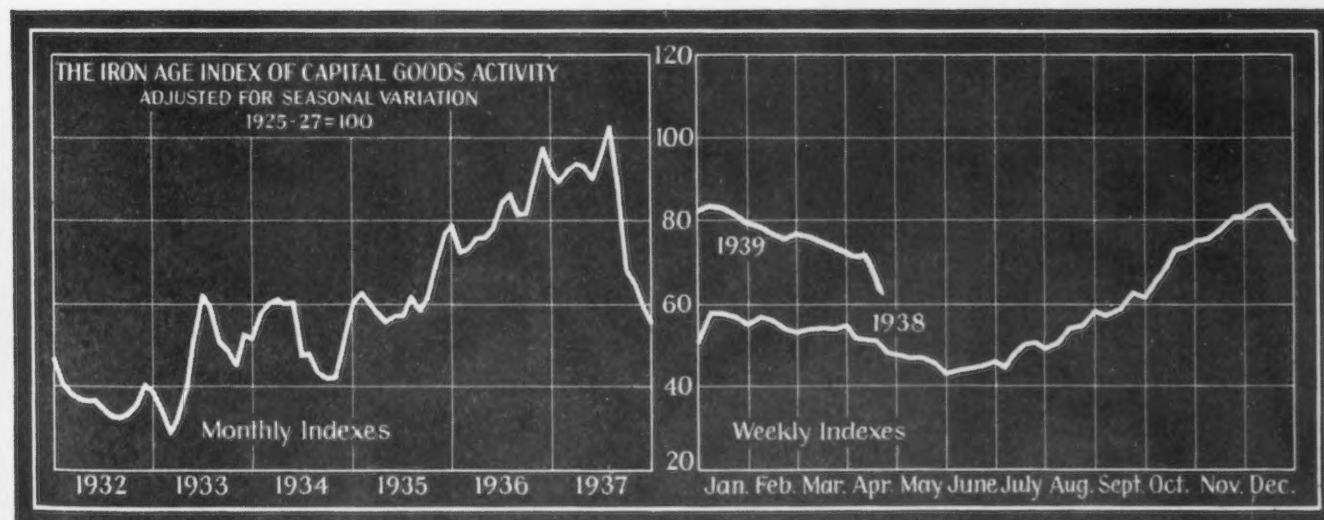
Ingot Production Tapers One Point to 50½%



		Pitts- burgh	Chicago	Valleys	Phila- delphia	Cleve- land	Wheel- ing	Detroit	Southern	S. Ohio River	Western St. Louis	East- ern	Aggre- gate		
District Ingot Production, Per Cent of Capacity	{ CURRENT WEEK..	42.0	53.5	42.0	36.0	37.0	47.0	76.0	55.0	46.5	53.5	60.0	46.5	50.0	50.5
	{ PREVIOUS WEEK..	45.0	53.5	46.0	36.0	37.0	44.5*	76.0	55.0	46.5	55.5	60.0	46.5	50.0	51.5
*Corrected.															

*Corrected.

Capital Goods Index Sags to Six-Month Low



THE output of the capital goods industries in the past week, as measured by THE IRON AGE index, broke to the lowest level since Oct. 1, 1939. This decline, the sixth consecutive one, brought the index down to 64.3 per cent of the base years, as compared with 70.7 in the preceding week. The chief cause of the drop was the bituminous coal strike which has caused a sharp curtailment in originating shipments and related industrial activity in Pittsburgh. The steel series, which declined 5 points, and the construction series, off 5.9 points, also contributed to the week's drop. Minor losses in physical output in these

latter two components was greatly magnified when adjusted against a rising seasonal trend.

	Week Ended Apr. 15	Week Ended Apr. 8	Comparable Week	
Steel ingot production ¹	65.0	70.0	1938	1929
Automobile production ²	73.9	74.9	40.1	123.1
Construction contracts ³	80.7	86.6	49.8	127.1
Forest products carloadings ⁴	48.1	48.9*	73.2	148.4
Production and shipments, Pittsburgh District ⁵	53.9	73.3	40.1	132.7
Combined index	64.3	70.7*	51.5	120.0
			50.9	130.3

*Revised.

Sources: 1. THE IRON AGE; 2. Ward's Automotive Reports; 3. Engineering News-Record; 4. Association of American Railroads; 5. University of Pittsburgh.

... SUMMARY OF THE WEEK ...

... Ingot production declines for fifth consecutive week.

• • •

... Steel scrap composite in sharpest break in year and a half.

• • •

... Threatening coal shortage brings banking of some blast furnaces.

THE downward trend in iron and steel activity continues. For the fifth consecutive week, ingot production has declined, though the drop this week to 50½ per cent is a loss of only one point compared with three points last week, indicating, perhaps, that production has been brought into closer alinement with orders.

With the exception of structural steel and tin plate, most steel products are in lighter demand. Aggregate orders of some steel companies during the first half of April were from 10 to 30 per cent below those of the comparable period in March.

The uncertainty which is affecting all branches of the industry is reflected in scrap markets. The sharpest break in THE IRON AGE composite scrap price in a year and a half, amounting to 66c. a ton, has brought this figure down to \$14.42. Declines of \$1 at Chicago, 75c. at Pittsburgh and 25c. at Philadelphia contributed to this result. There have also been reductions of 50c. in some grades at Buffalo, Detroit, Cincinnati and St. Louis. Were it not for the influence of export transactions, prices in the East probably would have declined further.

FAILURE of the conferees in the bituminous coal situation to reach an agreement has brought about a more conservative operating policy among some of the steel companies. Although large plants are well protected for the next few weeks, the Carnegie-Illinois Steel Corp. has banked five of its blast furnaces to conserve coking coal. Some of the smaller companies in varied lines of manufacture are beginning to feel the pinch of low coal supplies. Vessel operators on the Great Lakes are finding it difficult to schedule coal shipments for the upbound trips of ore carriers. In 1922 a bituminous coal strike which lasted five months created a serious scarcity of fuel, restricted production of pig iron and steel, brought rising prices for coke, pig iron and steel, and also higher costs for pig iron and steel manufacture. During that year pig iron rose \$14.52 and finished steel \$10.70 a ton, according to THE

IRON AGE composite prices. Although a part of these advances occurred after the strike was settled, the impetus came from the scarcity conditions created by the coal strike.

ALTHOUGH steel production has been declining in the United States, a tighter steel situation is developing in Great Britain, where output of more than a million tons in March, virtually capacity, is not yet satisfying urgent requirements of the government for its armament program. Commercial buyers, although affected by the political uncertainty in Europe, are sensing the danger of delay in placing steel orders. Because of the shortage of scrap in England, additional blast furnaces are being put in blast.

For the first time since war preparations in Europe were begun, inquiries have been received in the United States for sizable quantities of shell steel and other munitions material. These are coming chiefly from England and Canada.

IN the domestic field the outstanding orders and inquiries are for construction steels, railroad material and tin plate. Miscellaneous business is in fair volume, but individual orders are so small that mill costs are rising because of frequent roll changes, a usual development in a period of extreme hand-to-mouth buying.

Lettings of fabricated structural steel in the week were upward of 25,000 tons, the highest total since the first week of January. Mill specifications against contracts previously booked are in a rising trend. New structural projects out for bids totaled only about 15,000 tons, but a great deal of work on which bids have gone in is awaiting award. Lettings of reinforcing steel were about 8700 tons, while new projects call for 20,400 tons, these including 9000 tons for a Social Security building in Washington.

Rail orders included 15,167 tons placed by the Erie, 4000 tons for the Virginian and 2400 tons by the Nickel Plate. The Maine Central ordered 300 box cars from the Magor Car Corp. An inquiry from the Central of Brazil calls for 1000 freight cars.

Tin plate production has risen to 63 per cent, which is a fairly good rate considering that capacity in this product is now well above potential requirements of a very active year.

Automobile manufacturers are placing orders with die shops for 1940 models, for which some steel possibly will be bought in May. Meanwhile assemblies of 1939 models are proceeding at a steady pace, but it is still doubtful whether much more steel will be bought for completion of the runs on these models in view of the fact that 1940 cars will make an early appearance.

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Rails and Semi-finished Steel

Per Gross Ton:	Apr. 18, 1939	Apr. 11, 1939	Mar. 21, 1939	Apr. 19, 1938
Rails, heavy, at mill	\$40.00	\$40.00	\$40.00	\$42.50
Light rails: Pittsburgh, Chicago, Birmingham	40.00	40.00	40.00	43.00
Rerolling billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point	34.00	34.00	34.00	37.00
Sheet bars: Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point	34.00	34.00	34.00	37.00
Slabs: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point	34.00	34.00	34.00	37.00
Forging billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham	40.00	40.00	40.00	43.00
Wire rods: Nos. 4 and 5, Pittsburgh, Chicago, Cleveland	43.00	43.00	43.00	47.00
Skelp, grvd. steel: Pittsburgh, Chicago, Youngstown, Coatesville, Sparrows Point, cents per lb.	1.90	1.90	1.90	2.10

Finished Steel

Cents Per Lb.:	Apr. 18, 1939	Apr. 11, 1939	Mar. 21, 1939	Apr. 19, 1938
Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham	2.25	2.25	2.25	2.45
Plates: Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Claymont	2.10	2.10	2.10	2.25
Structural shapes: Pittsburgh, Chicago, Gary, Buffalo, Bethlehem, Birmingham	2.10	2.10	2.10	2.25
Cold finished bars: Pittsburgh, Buffalo, Cleveland, Chicago, Gary	2.70	2.70	2.70	2.90
Alloy bars: Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton	2.80	2.80	2.80	3.00
Hot rolled strip: Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown, Birmingham	2.15	2.15	2.15	2.40
Cold rolled strip: Pittsburgh, Cleveland, Youngstown	2.95	2.95	2.95	3.20
Sheets, galv., No. 24: Pittsburgh, Gary, Sparrows Point, Buffalo, Middletown, Youngstown, Birmingham	3.50	3.50	3.50	3.80
Hot rolled sheets: Pittsburgh, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown	2.15	2.15	2.15	...
Cold rolled sheets: Pittsburgh, Gary, Buffalo, Youngstown, Cleveland, Middletown	3.20	3.20	3.20	...

Cents Per Lb.:

	Apr. 18, 1939	Apr. 11, 1939	Mar. 21, 1939	Apr. 19, 1938
Wire nails: Pittsburgh, Chicago, Cleveland, Birmingham	2.45	2.45	2.45	2.75
Plain wire: Pittsburgh, Chicago, Cleveland, Birmingham	2.60	2.60	2.60	2.90
Barbed wire, galv.: Pittsburgh, Chicago, Cleveland, Birmingham	†3.30	3.30	3.30	3.40
Tin plate, 100 lb. base box: Pittsburgh and Gary	\$5.00	\$5.00	\$5.00	†\$5.35

*Pittsburgh prices only.
†Applies to 80-rod spools only.
‡Subject to post-season adjustment.

Pig Iron

Per Gross Ton:	Apr. 18, 1939	Apr. 11, 1939	Mar. 21, 1939	Apr. 19, 1938
No. 2 fdy., Philadelphia	\$22.84	\$22.84	\$22.84	\$25.84
No. 2, Valley furnace	21.00	21.00	21.00	24.00
No. 2, Southern Cln'ti	21.06	21.06	21.06	23.89
No. 2, Birmingham	17.38	17.38	17.38	20.38
No. 2, foundry, Chicago†	21.00	21.00	21.00	24.00
Basic, del'd eastern Pa.	22.34	22.34	22.34	25.34
Basic, Valley furnace	20.50	20.50	20.50	23.50
Malleable, Chicago†	21.00	21.00	21.00	24.00
Malleable, Valley	21.00	21.00	21.00	24.00
L. S. charcoal, Chicago	28.34	28.34	28.34	30.34
Ferromanganese, seab'd carlots	80.00	80.00	80.00	102.50

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Scrap

Per Gross Ton:	Apr. 18, 1939	Apr. 11, 1939	Mar. 21, 1939	Apr. 19, 1938
Heavy melting steel, P'gh...	\$15.00	\$15.75	\$16.00	\$12.25
Heavy melting steel, Phila...	15.50	15.75	15.25	13.25
Heavy melting steel, Ch'go...	12.75	13.75	14.25	11.25
Carwheels, Chicago	12.50	13.00	13.00	13.00
Carwheels, Philadelphia	16.25	16.75	16.75	15.75
No. 1 cast, Pittsburgh	15.25	15.50	15.50	14.25
No. 1 cast, Philadelphia	16.75	16.75	16.75	15.75
No. 1 cast, Ch'go (net ton)	11.75	12.25	12.75	10.75

Coke, Connellsville

Per Net Ton at Oven:	Apr. 18, 1939	Apr. 11, 1939	Mar. 21, 1939	Apr. 19, 1938
Furnace coke, prompt	\$3.75	\$3.75	\$3.75	\$4.00
Foundry coke, prompt	4.75	4.75	4.75	5.00

Non-Ferrous Metals

Cents per Lb. to Large Buyers:	Apr. 18, 1939	Apr. 11, 1939	Mar. 21, 1939	Apr. 19, 1938
Copper, electrolytic, Conn.	10.50	10.75	11.25	10.00
Copper, lake, New York	10.75	10.75	11.375	10.125
Tin (Straits), New York	47.50	45.95	46.15	39.00
Zinc, East St. Louis	4.50	4.50	4.50	4.25
Zinc, New York	4.89	4.89	4.89	4.64
Lead, St. Louis	4.60	4.60	4.70	4.35
Lead, New York	4.75	4.75	4.85	4.50
Antimony (Asiatic), N. Y.	14.00	14.00	14.00	15.75

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

The Iron Age Composite Prices

Finished Steel

	April 18, 1939	One week ago	One month ago	One year ago
2.286c. a Lb.	2.286	2.286	2.286	2.512

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

Pig Iron

	April 18, 1939	One week ago	One month ago	One year ago
\$20.61 a Gross Ton	20.61	20.61	20.61	23.25

Based on average for basic iron at Valley furnace and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Steel Scrap

	April 18, 1939	One week ago	One month ago	One year ago
\$14.42 a Gross Ton	15.08	15.17	15.17	12.25

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	High	Low	High	Low	High	Low
1939	2.512c., May 17	2.211c., Oct. 18	\$23.25, June 21	\$19.61, July 6	\$15.29, Mar. 28	\$14.42, Apr. 18
1938	2.512c., Mar. 9	2.249c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	15.00, Nov. 22	11.00, June 7
1937	2.249c., Dec. 28	2.016c., Mar. 10	19.73, Nov. 24	18.73, Aug. 11	21.92, Mar. 30	12.92, Nov. 10
1936	2.062c., Oct. 1	2.056c., Jan. 8	18.34, Nov. 5	17.83, May 14	17.75, Dec. 21	12.67, June 9
1935	2.118c., Apr. 24	1.945c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.42, Dec. 10	10.33, Apr. 29
1934	1.953c., Oct. 3	1.792c., May 2	16.90, Dec. 5	13.56, Jan. 3	13.00, Mar. 13	9.50, Sept. 25
1933	1.915c., Sept. 6	1.870c., Mar. 15	14.81, Jan. 5	13.56, Dec. 6	12.25, Aug. 8	6.75, Jan. 3
1932	1.981c., Jan. 13	1.883c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	8.50, Jan. 12	6.43, July 5
1931	2.192c., Jan. 7	1.962c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	11.33, Jan. 6	3.50, Dec. 29
1930	2.223c., Apr. 2	2.192c., Oct. 29	18.71, May 14	18.21, Dec. 17	15.00, Feb. 18	11.25, Dec. 9
1929	2.192c., Dec. 11	2.142c., July 10	18.59, Nov. 27	17.04, July 24	17.58, Jan. 29	14.08, Dec. 3
1928					16.50, Dec. 31	13.08, July 9

... THIS WEEK'S MARKET NEWS ...

STEEL OPERATIONS

... Ingot output declines for fifth consecutive week

INGOT output has declined for the fifth consecutive week, though the decline this week is only one percentage point as against three points last week. This week's rate is estimated by THE IRON AGE at 50½ per cent, lowest of the year thus far. The American Iron and Steel Institute on Monday estimated this week's output at 50.9 per cent.

Only one district made a gain. At BUFFALO there was a rise from 44½ per cent last week to 47 per cent this week.

A decline of three points to 42 per cent occurred at PITTSBURGH, YOUNGSTOWN fell four points to 42 per cent, and the SOUTHERN OHIO district dropped two points to 53½ per cent. In other districts operations are unchanged from last week.

The district that is making the best showing is WHEELING - WEIRTON, which remains at 76 per cent, this relatively high rate being influenced largely by tin plate production.

NEW BUSINESS

... Orders lower for most products excepting structural steel and tin plate

TOTAL steel bookings at PITTSBURGH in the past week were slightly in excess of the previous week's volume owing to heavier tin plate and structural specifications. Steel orders so far this month are a shade ahead of those placed during the corresponding March period, this improvement also being due to tin plate and structural specifications. Producers look for a comparatively slow market during the next few weeks, with little or no indication of a sharp drop in the volume of fresh orders.

In most steel divisions at CLEVELAND and YOUNGSTOWN aggregate orders for the first half of April fell off 15 to 30 per cent from the comparable period of March. Producers, however, hold to the opinion that present conditions may not be prolonged, and predict gradual improvement toward the latter part of this quarter.

Considerable construction tonnage which came out for bids during first quarter remains to be specified and rolled. Tin plate producers have excellent backlogs. Some of the rail, pipe and plate mills hold fair-sized order books. Cold-finished bars continue to move well, principally because of demand by machinery manufacturers.

While the coal strike to date has had very little effect upon the larger industries, here and there throughout Ohio some plants in varied fields are beginning to feel pinched, and those possessing more ample supplies of fuel are becoming more conservative.

Orders for April thus far in the CHICAGO district are running even with the same period in March to nearly 10 per cent behind. The opinion is heard more and more that a return to normal business will not be seen until a change abroad and in domestic politics is brought about. Considerable additional tonnage would be required to boost the CHICAGO rate appreciably for any length of time.

Miscellaneous demand is probably the largest single support of the CHICAGO market today. Some rail tonnages have come in lately but in the aggregate they are unimportant from a mill operating standpoint. Important motor car interest is not expected until next month at the earliest. Tractor plants are the busiest of the farm equipment plants. A large number of building projects are off the drawing boards but are being held back because of general uncertainty. Among construction bright spots is the news that several refineries and short pipe lines are being planned for the southern Illinois oil fields.

Inventories are low and day-to-day purchasing continues the general rule.

The 15,000 tons of steel required by the Mount Vernon Car Mfg. Co. for building 1150 cars for the Missouri Pacific Railroad is expected to be placed within the next few weeks. Otherwise, there is very little new business coming up in the ST. LOUIS area.

BUFFALO mill operators report a slight letdown this week. New orders are dragging considerably.

In NEW YORK nearly all steel mills experienced a sharp letdown in orders for all products except structural steel and tin plate.

A slight pickup seems assured dur-

ing the next month for construction steel on the PACIFIC COAST. Awards are up for the week, and tonnage placed during the early months has kept the year's tonnage to date slightly ahead of 1938. The rate of appearance of new projects has stepped up slightly.

PRICES

... Quotations are firm, though market lacks severe test

BASE prices on major steel products appear to be holding firm, although a substantial test of the market is lacking. To date no attempts to obtain concessions on steel for 1940 automobiles has been made, so far as can be learned.

Quantity deductions, which were revised recently and which became effective April, are being loosely interpreted by some mills. Complaints are heard from buyers, many of whom would prefer to go back to the former setup.

PIG IRON

... Orders and shipments are lower in some districts

UNDER existing conditions pig iron business is naturally showing no improvement. On the contrary, both orders and shipments are lower in some districts.

Reflecting slackened foundry operations, shipments from furnaces in the CLEVELAND and YOUNGSTOWN areas have dropped 5 to 10 per cent during the first half of April as compared with the like period in March. Foundries supplying construction and allied industries are slightly more active than those in other fields. Shipments have slowed down in ST. LOUIS district in the past week, and it seems likely there that the April movement will not exceed that of March. Other than one sale of 500 tons, the ST. LOUIS market has been quiet recently. In SOUTHERN OHIO machine tool builders are the most active, stove business, possibly coming next. Although shipments in that district are steady, there is very little new buying. It is possible that April shipments from EASTERN PENNSYLVANIA furnaces will drop below those of March and orders there are very scarce. Around New

YORK foundry operations are averaging about three days a week and pig iron purchases are limited to immediate requirements and shipments are running slightly below the March level.

In keeping with a lower rate of steel operation in the SOUTH, the Tennessee Coal, Iron & Railroad Co. has reduced the number of its active furnaces by one. There are now 13 furnaces in blast in that district.

Within a week 1000 tons of iron from India will be landed at BOSTON, but most of it is reported to have already been sold.

SEMI-FINISHED STEEL

... Tin bars account for major share of orders

BOOKINGS at PITTSBURGH in the past week were substantially unchanged from the previous week and the identical condition applies when orders so far this month are compared with the volume placed during the corresponding March period. The major share of current business continues to involve tin bar orders from non-integrated mills.

At CLEVELAND semi-finished orders during the first half of April were off approximately 30 per cent from the first two weeks of March.

SHEETS AND STRIP

... Orders make a poor showing ... Automotive buying light

THE poor showing in sheet and strip specifications at PITTSBURGH recently is due almost entirely to the falling off in automotive purchases. Demand from other consuming sources continues at about the same rate of activity as a month ago. Numerically, orders have increased but as indicated before individual bookings are unbelievably small and this condition is causing some producers concern because of the high production cost. Although some last minute buying by the automobile trade is expected before the end of the 1939 model season, tonnages are not expected to be large. Sheet and strip buying by home appliance manufacturers is showing a slight tendency to increase.

Incoming business at CLEVELAND and YOUNGSTOWN during the first two weeks of April fell off about 25 per cent from the comparable March

Market Sidelights

Larger steel companies in areas affected by the coal strike have supplies on hand sufficient to run at current schedules for the next four to six weeks. Continuation of the stalemate between the miners and the operators, however, could eventually result in serious interruption of steel activity and for this reason, many companies are conserving their supplies to the utmost. Carnegie-Illinois Steel Corp., Pittsburgh, has banked five of its blast furnaces as a protective measure. All coal above ground is earmarked so that those who deplete their present stocks will be without fuel unless the deadlock is broken.

Items that show some diversification in building construction projects are a \$5,000,000 news print mill to be built at Iuka, Miss., a \$2,000,000 cereal manufacturing building to be con-

structed in Buffalo, and a \$750,000 whiskey distillery at Elgin, Ill.

...

A strike of the teamsters' union in Chicago has caused a postponement of work on many building projects in that area, and a consequent tie-up in shipments of reinforcing and structural steel.

Koppers Co., Pittsburgh, has been awarded the contract for 1,000,000 lb. of bronze castings for the various shafts of the Delaware water shed which is being constructed by the New York City board of water supply from the Delaware lakes to the City of New York. The material will be made in the Bartlett Hayward division at Baltimore.

A Warren, Ohio, plant manufacturing steel kitchen cabinets and kindred equipment is working 24 hours per day in some departments. This is partly due to a large order received from a mail order house.

period. Many parts makers report their automotive orders curtailed or cancelled. While a few stamping plants remain active, their operations are outweighed by inactivity elsewhere.

Current orders in CHICAGO are mostly from miscellaneous sources. No outstanding tonnages are expected until buying for 1940 model motor cars begins. Makers of household equipment, washing machines, refrigerators, etc., continue fairly active. Agricultural machinery demand, except for tractor makers, is not important. Some comment has been heard from CHICAGO mills of consumer dissatisfaction with the revised quantity deduction setup.

Automobile ordering is conspicuous by its almost absence in SOUTHERN OHIO. Some users have reduced commitments while others have cancelled April orders, promising further purchases in May. Miscellaneous and galvanized bookings are largely responsible for the present demand.

Some sheet sellers in the NEW YORK metropolitan area report a sales volume up to the middle of the month equal to or slightly better than for the comparable March period, but this is the exception to the general trend, which is downward.

The volume of new orders in the PHILADELPHIA district has leveled off during the past week at approximately 10 to 15 per cent under the March average. The largest single outlet, auto body stamping plants, will be out

of the market for the next several months, although moderate lots are being released on existing orders. Miscellaneous demands are spotty and involve mostly small lots.

PLATES

... Pittsburgh orders holding up but dullness prevails elsewhere.

PLATE tonnage for structural fabrication at PITTSBURGH so far this month is about 20 per cent ahead of the same period last month. With a large amount of public projects coming to a head soon, this improved activity is expected to hold for the next few months at least.

Incoming orders so far this month at CLEVELAND showed a decline of around 22 per cent from the identical period in March. Low bidder on three additional sections of the Toledo, Ohio, pipe line involving 11,000 tons of plates is Walter L. McGee, of Minneapolis, whose bid was \$1,040,230.

CHICAGO sales of plates are insignificant. Structural fabricators are moderately active, but heavy machinery, and railroad demand is not impressive.

Because of heavy rains, operations in the new Illinois oil fields near St. Louis have been slowed down considerably, resulting in a reduction in orders for tanks. Within the next 30 days, when it is expected the ground

will be in condition for work, it is believed that there will be a revival of tank buying on a moderate scale.

After a small flurry of buying 10 days ago, the NEW YORK plate market has almost dried up and sellers are discouraged as to the future.

About 4000 tons of liner plates will be required for the sixth section of the CHICAGO subway, bids for which are to be closed May 4.

RAILROAD BUYING

... Additional orders for rails placed. Maine Central buys 300 cars

A FEW additional orders for rails have been placed.

Erie Railroad has allocated 15,167 gross tons of 112-lb. and 131-lb. rail as follows: to Carnegie-Illinois Steel Corp., 12,135 gross tons; to Bethlehem Steel Co., 1972 tons, and to Inland Steel Co., 1060 tons.

Nickel Plate Road has placed 2400 tons of 112-lb. rail as follows: Carnegie-Illinois Steel Corp., 1560 gross tons; Inland Steel Co., 440 tons, and Bethlehem Steel Co., 400 tons.

The Virginian has ordered 3000 tons of rails from the Bethlehem Steel Co. and 1000 tons from the Carnegie-Illinois Steel Corp.

Inland Steel Co. will furnish 530 tons of rails to the Grand Trunk Western.

The principal order for equipment is 300 box cars placed by the Maine Central with the Magor Car Corp., Passaic, N. J. Phelps Dodge Corp. has ordered four diesel-electric locomotives from the Electro Motive Corp. Despatch Shops, Inc., East Rochester, N. Y., will build 200 covered hopper cement cars in its shops. The order of the Missouri Pacific, which was incorrectly reported last week, calls for 1025 gondola cars and 125 box cars, a total of 1150.

The Central of Brazil is in the market for 1000 freight cars, the Union Tank Car Co. is inquiring for 10 to 30 tank cars, and the Union Railroad Co. has asked for prices on 10 caboose cars.

The a. c. f. Motors Co. has received additional orders for seven motor coaches, of which six are for the Conestoga Transportation Co., Lancaster, Pa., and one for the Vermont Transit Co., Burlington, Vt.

STRUCTURAL STEEL

... Awards and inquiries are running in fair volume

NEW orders and specifications against old orders for structural steel are in fair volume. From PITTSBURGH it is reported that orders placed on mill books during the first half of April were about 20 per cent above those of the comparable March period. Rolling schedules are expected to remain quite steady despite the falling off in some other lines.

Among the larger fabricated structural awards of the week are the following: 3890 tons to a hospital at Brentwood, L. I., to Bethlehem Fabricators, Inc.; 3750 tons for a Lorain, Ohio, bridge superstructure to American Bridge Co.; 3500 tons for buildings for the Celanese Corp. at Pearisburg, Va., to Virginia Bridge Co.; 2089 tons for superstructure of the carter Road bridge, CLEVELAND, to Mount Vernon Bridge Co.; 1200 tons for a Liquor Board building at Harrisburg, Pa., to Bethlehem Steel Co.; 1120 tons for the East River Drive, NEW YORK, to American Bridge Co.; 1000 tons for a Government garage in BROOKLYN to American Bridge Co.

New projects out for bids include 2500 tons for a bridge at SEATTLE, 2500 tons for a municipal auditorium at BUFFALO, 1200 tons for a music hall at Buffalo, 1300 tons for a field house and gymnasium for the Michigan State Board of Agriculture at East Lansing, Mich., and 1000 tons for a store in DETROIT for Montgomery Ward & Co.

Considerable additional business previously reported is pending which may be awarded within a short time.

MERCHANT BARS

... Orders are smaller than a month ago

A SLIGHT hesitancy has been noted in hot rolled bar sales at PITTSBURGH. Orders so far this month are down slightly from the level of the same period a month ago. Despite the falling off in total tonnages, which in some cases is caused by a drop in automotive purchases, a healthy diversification in orders persists.

While merchant bar orders during the first half of April were down approximately 15 per cent at CLEVELAND from the comparable March period, the decline is somewhat less than experienced by other products. Shipments to cold drawers continue good.

Farm equipment manufacturers having ended their tillage manufacturing season have been slow to start upon harvesting machinery, possibly due to the backward season.

Tractor manufacturers and jobbers are the best bar buyers in the CHICAGO area. Forgers and parts makers serving the tractor makers are also fairly busy. Farm equipment plants are not especially active nor are automobile suppliers.

BOLTS, NUTS, RIVETS

... April orders declining below those of March

MARCH apparently was the peak for the first half of the year. With automotive production waning and other consumers a trifle more hesitant, April orders, production and shipments will be reduced. Cap screw manufacturers at CLEVELAND report orders have tapered considerably during the past week.

REINFORCING BARS

... Social Security building in Washington calls for 9000 tons

INQUIRIES for reinforcing bars for new projects are headed by 9000 tons for the Social Security Building, Washington, bids on which close April 26. The Dearborn Street crossing of the Chicago subway will require 3350 tons, bids for which are to be taken May 4. The United States Engineer at Los Angeles has taken bids on 2000 tons, award of which may be made shortly.

Substantial tonnages will be required for four Federal projects in northern California for which bid dates have been set. Largest is a group of buildings for a Department of Agriculture laboratory at Albany, Cal. A Navy barracks at Alameda may require close to 1000 tons. A prison building on Alcatraz Island and a Navy shop at Mare Island complete the group.

Awards during the week were fairly numerous, but many of the jobs were in lots under 500 tons. The larger awards were 950 tons for a junior college building in San Francisco, booked by Bethlehem Steel Co.; 500 tons for a water and light plant at Owensboro, Ky., taken by Laclede Steel Co., and 463 tons for two sections of the Pennsylvania Turnpike in Somerset County, Pa., which will

be furnished by the Jones & Laughlin Steel Corp.

Between now and July bids will be taken on four additional sections of the CHICAGO subway which will take a total of about 18,000 tons of concrete bars. John Marsch Co., Inc., has awarded 2800 tons for the fourth section to Concrete Steel Co.

TUBULAR GOODS

... *Shell Union inquires for pipe for New England line*

THE Shell Union Oil Corp., New York, is inquiring for about 3500 to 4000 tons of pipe for an oil line to be built in New England, the quantity to depend on the size of pipe decided upon.

Total tubular goods purchases at PITTSBURGH reflect little or no change from the average levels of the past several weeks. Oil-country goods specifications are being held to an absolute minimum by oil companies and the only item showing any signs of activity is merchant pipe.

At CLEVELAND and YOUNGSTOWN demand for tubular items remains moderate except for the strong activity in line pipe reported last week.

WIRE PRODUCTS

... *Merchant buying affected by general uncertainty*

AGGREGATE wire sales at PITTSBURGH are virtually unchanged from a week ago. The volume of manufacturers' wire business is being moderately affected by smaller automotive purchases. Merchant wire buying continues to be influenced somewhat by the general uncertainty surrounding business conditions.

At CLEVELAND producers report a decline during the first half of April

in orders as compared to early March, but the drop has not been as sharp as might be expected. Shipments are comparable to those during the first half of March. Manufacturers' wire is moving the slowest of all products.

Bad weather continues to prevail in the CHICAGO district and all over the Middle West. Storms, snow and rain are postponing much of the spring farm work that ordinarily requires the purchase of various types of merchant wire products. Manufacturing wire sales are on a par with earlier weeks of the month but will probably not show much of an increase until automobile production increases.

TIN PLATE

... *Operations higher at 63% as orders expand*

TIN plate operations this week are estimated at 63 per cent, up three points from a week ago. The volume of specifications from large sanitary can makers has shown a moderate increase in the past week or so. This tendency is expected to be accentuated over the next several weeks, with a corresponding rise in operations anticipated. Miscellaneous buying from diverse sources continues to hold up exceptionally well.

IRON ORE

... *Stocks on hand April 1 totaled 25,872,124 tons*

MARCH consumption of Lake Superior iron ore was 3,316,691 gross tons, compared with 2,852,540 tons in February, and 1,980,182 tons in March, 1938, according to the Lake Superior Iron Ore Association, Cleveland.

Stocks of ore are considerably reduced in comparison with one year

ago. On hand April 1 at furnaces were 21,054,249 gross tons of ore and at Lake Erie docks were an additional 4,817,875 tons, making a total of 25,872,124 tons, compared with 35,223,301 tons on the same date in 1938.

There were 97 furnaces using Lake ore in blast March 31, compared with 93 operating at the previous report, according to the association.

Wiley New President Of Harbison Walker

PITTSBURGH—Raymond Wiley, formerly vice-president, Harbison Walker Refractories Co., Pittsburgh, has been elected president of that company. J. E. Lewis, who has been both chairman and president, retains the board chairmanship. J. E. McCloskey, Jr., who has been a director of the company, has been made vice-chairman of the board. Other officers have been re-elected.

Sheet & Tube Workers Average 93.4c. Hourly

A SAVINGS of 20c. a day for the company by each Youngstown Sheet & Tube Co. employee would effect a million dollar economy a year, Frank Purnell, president, says in the first pamphlet report to the concern's 20,000 workers.

"We should work safely," he said, "thus reducing injury, suffering and loss of time. We must economize by using the materials, supplies and equipment with which we work with the same care and consideration as we would our own."

Sheet & Tube employees last year averaged 93.4c. per hr. compared with an average of 92.1c. for the entire steel industry, Mr. Purnell said. His report told of the company's affairs in non-technical language.

Weekly Bookings of Construction Steel

	Week Ended				Year to Date	
	Apr. 18, 1939	Apr. 11, 1939	Mar. 21, 1938	Apr. 19, 1938	* 1939	* 1938
Fabricated structural steel awards	25,350	23,925	16,310	8,900	315,710	202,975
Fabricated plate awards	0	3,470	6,100	225	49,210	45,390
Steel sheet piling awards	0	4,060	1,125	0	18,565	8,750
Reinforcing bar awards	8,675	4,800	9,800	4,360	146,095	63,655
Total Letting of Construction Steel..	34,025	36,255	33,335	13,485	529,580	320,770

* Figures in these columns revised.

FABRICATED STEEL

... Lettings advance to 25,350 tons from 23,935 last week ... New projects decline to 14,900 tons from 17,800 tons a week ago.

NORTH ATLANTIC STATES AWARDS

- 3890 Tons, Brentwood, L. I., Pilgrim Hospital building, to Bethlehem Fabricators, Inc., Bethlehem, Pa., through Turner Construction Co.
- 1200 Tons, Harrisburg, Pa., Liquor Board building, to Bethlehem Steel Co., Bethlehem, Pa.
- 1120 Tons, New York, East River Drive, East 79th to East 90th Streets, contract 6, to American Bridge Co., Pittsburgh, J. Rich Steers, Inc., general contractor.
- 1000 Tons, Brooklyn, garage, to American Bridge Co., Pittsburgh, through Procurement Division, Treasury Department.
- 675 Tons, Tipton, Pa., State highway bridge, to Bethlehem Steel Co., Bethlehem, Pa.
- 665 Tons, Jersey City, N. J., additions to Medical Center, to F. G. Schaefer Iron Works, Edgewater, N. J.
- 600 Tons, New York, reconstruction Pier 99, to American Bridge Co., Pittsburgh.
- 510 Tons, Washington, addition to Bowen building, to Lehigh Structural Steel Co., Allentown, Pa., George A. Fuller Co., general contractor.
- 420 Tons, Weehawken, N. J., school, to Lehigh Structural Steel Co., Allentown, Pa.
- 400 Tons, Newark, N. Y., school, to Bethlehem Steel Co., Buffalo.
- 375 Tons, Newark, N. J., New Jersey State garage, to Lehigh Structural Steel Co., Allentown, Pa.
- 335 Tons, Wappingers Falls, N. Y., school, to American Bridge Co., Pittsburgh, John Elise Co., general contractor.
- 275 Tons, Philadelphia, Wynnewood housing project, to Belmont Iron Works, Philadelphia; Nelson Pedley, general contractor.
- 255 Tons, Hopedale, Mass., building and building alterations for Draper Corp., to American Bridge Co., Pittsburgh.
- 250 Tons, New York, buildings between land plane hangars, North Beach Airport, to Bethlehem Steel Co., Bethlehem, Pa.
- 240 Tons, Bennington, Vt., Park Street bridge, to Bethlehem Steel Co., Bethlehem, Pa.
- 200 Tons, Bennington-Bolton-Hinesburg, Vt., State bridge, to Bethlehem Steel Co., Bethlehem, Pa., through Bennington Construction Co., Bennington, Vt., contractor.
- 180 Tons, Edgewater, N. J., building extensions for Lever Brothers Co., to Bethlehem Steel Co., Bethlehem, Pa.
- 175 Tons, Andover, N. Y., central school, to R. S. McMannus Steel Construction Co., Buffalo, L. C. Whiteford, general contractor.
- 160 Tons, Pittsburgh, shop and laboratory building, to Keystone Engineering Co., Pittsburgh, B. L. Winner Co., general contractor.
- 145 Tons, Jeannette, Pa., theater, to Pittsburgh Bridge & Iron Works, Pittsburgh, Westmoreland Construction Co., general contractor.
- 120 Tons, Flushing, L. I., six-story apartment building, to an unnamed bidder.
- 100 Tons, Richmond, Vt., bridges, to American Bridge Co., Pittsburgh.
- 100 Tons, Cambridge, Mass., city incinerator, to West End Iron Works, Cambridge, through M. Slotnick, Boston, contractor.

THE SOUTH

- 2625 Tons, Pearisburg, Va., celanese plant, to Virginia Bridge Co., Roanoke, Va., Hughes-Foulkrod Co., general contractor.
- 950 Tons, Dallam County, Tex., bridge, to Capitol Steel & Iron Co., Oklahoma City, R. R. Tway, general contractor.
- 560 Tons, Owensboro, Ky., water and power plant, to American Bridge Co., Pittsburgh, Engstrom & Wynn, Inc., general contractor.
- 230 Tons, McCulloch County, Tex., bridge, to Central Texas Iron Works, Waco, Tex., Jensen Construction Co., general contractor.
- 225 Tons, Roanoke, Va., acid recovery building, to an unnamed fabricator.
- 195 Tons, Grundy, Va., State highway bridge, to Virginia Bridge Co., Roanoke, Va., Haley, Chisholm & Morris Co., general contractor.

- 195 Tons, Harris, N. C., State highway bridge, to Virginia Bridge Co., Roanoke, Va., Hobbs Peabody, general contractor.

CENTRAL STATES

- 3750 Tons, Lorain, O., East 21st Street bridge superstructure, to American Bridge Co., on bid of \$634,589.
- 2090 Tons, Cleveland, Carter Road bridge superstructure, to Mount Vernon Bridge Co., Mount Vernon, Ohio.
- 800 Tons, Chicago, Central Park pumping station, to Joseph T. Ryerson & Son, Inc., Chicago.
- 700 Tons, Chicago, South Laramie Avenue viaduct, to Bethlehem Steel Co., Bethlehem, Pa.
- 320 Tons, Fairbury, Neb., Jefferson County viaduct, to Fort Pitt Bridge Works Co., Pittsburgh.
- 265 Tons, Chicago, Wrightwood Avenue viaduct, to Wisconsin Bridge & Iron Co., Milwaukee, through Northern Bridge Co., Chicago.

WESTERN STATES

- 800 Tons, Portland Ore., Columbia-Willamette crossing towers, to Bethlehem Steel Co.
- 414 Tons, Oregon, and Washington points, substation structures, Bonneville project, to Bethlehem Steel Co.
- 405 Tons, Los Angeles, post office addition, to Consolidated Steel Corp., Los Angeles, through Baruch Corp., Los Angeles, contractor.
- 375 Tons, Powder River County, Mont., Powder River bridge, to Missouri Valley Bridge & Iron Co., Leavenworth, Kan., through W. P. Roscoe Co., Billings, Mont., contractor.
- 330 Tons, Grand Coulee Dam, Wash., reverse flow coaster gate frames, to American Bridge Co., Denver.
- 215 Tons, Missoula County, Mont., bridge, to J. B. Klein Iron & Foundry Co., Oklahoma City.
- 125 Tons, Los Angeles, sound stage, to Bethlehem Steel Co., Los Angeles.
- 117 Tons, Seattle, steel for Alaskan bridge, to Worden-Allen Co., Milwaukee.

PENDING STRUCTURAL PROJECTS

NORTH ATLANTIC STATES

- 2500 Tons, Buffalo, municipal auditorium; bids close May 2.
- 1200 Tons, Buffalo, Kleinhans Music Hall; bids close May 9.
- 465 Tons, New York, 33,000 ft. of curbing for city.
- 400 Tons, Portsmouth, N. H., Navy Yard building; bids in several weeks.
- 400 Tons, Clyde, N. Y., school, Sauke Bros., Rochester, N. Y., low bidders.
- 400 Tons, Pittsburgh, Leech Farm hospital additions.
- 365 Tons, Grafton, Vt., State bridges.
- 260 Tons, Brooklyn, bridge.
- 250 Tons, Marlboro and Newfane, Vt., State bridges.
- 235 Tons, Guilford and Halifax, Vt., State bridges.
- 230 Tons, New York, club house, Harlem, for Children's Aid Society.
- 215 Tons, New York, office building for Deering, Milliken Co.
- 200 Tons, New Brighton, N. Y., board plant for U. S. Gypsum Co.
- 175 Tons, Long Island City, N. Y., building for International Harvester Co.
- 140 Tons, Bridgewater and Goshen, Vt., State bridges.
- 135 Tons, Utica, N. Y., State building.
- 115 Tons, New York, building for Central Park Realty Co.

CENTRAL STATES

- 1300 Tons, East Lansing, Mich., field house and gymnasium, Michigan State Board of Agriculture; bids May 1.
- 1000 Tons, Detroit, Montgomery Ward & Co., store and warehouse.
- 900 Tons, State of Wisconsin, 11 bridges; bids April 25.
- 770 Tons, Mishawaka, Ind., power house extension for Indiana & Michigan Electric Co.
- 225 Tons, Detroit, sewer tunnel lining.

- 125 Tons, Columbus, Ohio, building for Ohio University.
- Unstated tonnage, State of Indiana, six or eight bridges; bids April 25.

WESTERN STATES

- 2500 Tons, Seattle, Ballard bridge approaches; bids May 4.
- 200 Tons, San Francisco, St. Mary's hospital; bids in.
- 200 Tons, Leavenworth, Wash., fish hatchery; bids May 2.

FABRICATED PLATES

PENDING PROJECTS

- 11,000 Tons, Toledo, Ohio, sections C, D, and E of intake line; Walter L. McGee, Minneapolis, low bidder on general contract.
- 120 Tons, Pollock, Cal., Southern Pacific relocation (Bureau of Reclamation Specification 839); bids May 2.
- Unstated tonnage, Fresno Dam, Mont., 72-in. outlet pipes (Specification 1221-D); bids May 3.

SHEET PILING

PENDING PROJECTS

- 250 Tons, Cincinnati, Sixth Street viaduct, to Bethlehem Steel Co., Bethlehem, Pa.
- 132 Tons, Lawrence County, Ohio, State project, Midland Construction Co., Columbus, general contractor. (Previously reported.)

SWOC Pickets Hold Pittsburgh Foundry

GLASSPORT, PA.—SWOC pickets early this week surrounded the plant of the Pittsburgh Steel Foundry Corp. following a breakdown of negotiations between the company and the union over the former's request for a 15 per cent pay cut. The plant has been closed since March 2 due to lack of business. Although union spokesmen claim the company refused to compromise in the negotiations, W. B. Brookes, assistant to the president, stated that the scale now proposed for the 550 employees "represents a compromise from our original request and is fair and equitable." It is expected that the company will seek to open its plant here with legal protection, since union pickets are allowing no one in the plant except company officials.

State Police Protect Steel & Wire Workers

DONORA, PA.—Following the appearance of Pennsylvania state police, operations at the American Steel & Wire Co.'s plant here resumed normal operations after a one day SWOC dues picketing disturbance early this week. What started out to be a dues collection campaign resulted in a general melee involving miners, bystanders, workers, and SWOC dues collectors. A few hundred workers were prevented from entering the company's gates but it is believed a large share of the trouble was traceable to demonstrations by miners who are idle because of the coal strike.

... NON-FERROUS ...

... Copper lowered to 10.50c., Valley ... Fair lead buying in nearby positions ... Zinc shipments holding up well.

NEW YORK, April 18—With domestic industrial activity failing to gain as had been expected and the foreign political situation showing no signs of improving, nervousness continues to rule in all non-ferrous markets here. Buyers are wary of forward commitments and are limiting purchases to supplies for immediate consumption. To add to the buyers' confusion, four prices now

exist in the copper market. Custom smelters reduced their quotations to 10.50c. per lb., Valley, on Wednesday, but the large mine producers continue to quote 10.75c. in the consistently quiet open market, quotations have been fluctuating between 10c. and 10.25c., while the export market has been moving between 10.10c. and 10.25c. per lb., c.i.f., usual base ports. The increase in buying expected at the

lower prices has been counteracted by the muddled price situation, with the result that sales are still dragging along in poor volume. Domestic deliveries of the red metal in March were 54,708 tons against 51,377 in February, 54,827 in January and 44,576 in March, 1938. Reserves at the end of March were 320,446 tons as compared with 308,908 in the preceding month. Foreign deliveries for March were 103,358 tons, as contrasted with 98,221 in February, 95,762 in January and 114,127 in March, 1938. Stocks abroad at the end of March were 185,945 tons against 184,206 at the end of February.

Lead

There was sufficient buying last week to enable one large interest to completely dispose of its intake, despite the nervousness that prevailed in the other markets. Total sales for the week were about 5200 tons, with over 60 per cent of this figure calling for April delivery. That month is all of 65 per cent covered, but buyers still hesitate to go into May to any great extent, with the consequence that about 70 per cent of May needs have yet to be covered. This morning's London price was around 2.95c. per lb. for spot, practically unchanged from a week ago, while the domestic price remains fairly firm at 4.75c. per lb., New York.

Zinc

In spite of the erratic course the foreign market has been following, the domestic situation is little changed. Buying continues very sluggish, with producers showing no inclination to press for sales at present price levels. The week's total of prime Western purchases was 1132 tons against 1281 in the previous week. Releases against contracts give no sign of abating and the week's total of 5037 tons shipped is taken as an indication that as yet there has been no recession in fabricating activities. Quotations here are unaltered at 4.89c. per lb., New York.

Tin

There was a moderately active demand for nearby tin all last week at prices which advanced from 45.95c. on Tuesday a week ago to 47.50c. per lb., New York, today. The trade credits the better buying to stocking by consumers against the possibility of a war cutting off supplies. The increased demand created somewhat of a shortage in spot metal and nearby positions are currently selling at a premium of 30 points over futures.

NON-FERROUS PRICES

Cents per lb. for early delivery

	Apr. 12	Apr. 13	Apr. 14	Apr. 15	Apr. 17	Apr. 18
Copper, Electrolytic ¹	10.50	10.50	10.50	10.50	10.50	10.50
Copper, Lake	10.75	10.75	10.75	10.75	10.75	10.75
Tin, Straits, New York	46.25	46.50	46.70	...	46.90	47.50
Zinc, East St. Louis ²	4.50	4.50	4.50	4.50	4.50	4.50
Lead, St. Louis ³	4.60	4.60	4.60	4.60	4.60	4.60

¹Delivered Conn. Valley, deduct ¼c. for New York delivery. ²Add 0.39c. for New York delivery. ³Add 0.15c. for New York delivery.

Warehouse Prices

Cents per lb., Delivered

	New York	Cleveland
Tin, Straits pig	48.25c.	50.25c.
Copper, Lake	11.75c.	11.875c.
Copper, electro	11.625c.	11.875c.
Copper, Castings	11.125c.	11.50c.
*Copper sheets, hot-rolled	18.87c.	18.87c.
*High brass sheets	16.98c.	16.98c.
*Seamless brass tubes	19.73c.	19.73c.
*Seamless copper tubes	19.37c.	19.37c.
*Brass rods	12.31c.	12.31c.
Zinc slabs	6.15c.	6.90c.
Zinc sheets, No. 9 casks	10.50c.	12.10c.
Lead, American pig	5.75c.	5.60c.
Lead, bar	6.35c.	8.25c.
Lead, sheets, cut	8.00c.	8.00c.
Antimony, Asiatic	15.00c.	17.00c.
Alum., virgin, 99 per cent plus	22.50c.	22.50c.
Alum., No. 1 remelt, 98 to 99 per cent	19.50c.	19.50c.
Solder, ½ and ½	28.60c.	28.75c.
Babbitt metal, commercial grade	21.25c.	21.00c.

* These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33 1/3; on brass sheets and rods, 40, and on brass and copper tubes, 25.

Old Metals

Cents per lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible ..	8.125c.	9.875c.
Copper, hvy. and wire ..	7.125c.	7.625c.
Copper, light and bottoms	6.375c.	6.625c.
Brass, heavy	4.25c.	4.75c.
Brass, light	3.375c.	4.125c.
Hvy. machine composition	6.25c.	7.75c.
No. 1 yel. brass turnings ..	4.00c.	4.50c.
No. 1 red brass or comp. pos. turnings	6.00c.	6.625c.
Lead, heavy	3.625c.	4.50c.
Cast aluminum	6.50c.	7.75c.
Sheet aluminum	12.25c.	13.75c.
Zinc	2.125c.	3.375c.

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered; virgin, 99 per cent plus, 20c.-21c. a lb.; No. 12 remelt No. 2 standard, 19c.-19.50c. a lb. NICKEL, electrolytic, 35c.-36c. a lb. base refinery. lots of 2 tons or more. ANTIMONY, prompt, New York; Asiatic, 14c. a lb., f.o.b.; American, 11.50c. a lb. QUICK-SILVER, \$93-\$94 per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 10.50c. a lb.

IRON AND STEEL SCRAP

... Sharpest break in prices recorded in year and a half, with composite price for No. 1 now at \$14.42, off 66c. from last week.

APRIL 18.—A Chicago mill which paid \$14.50 six weeks ago for No. 1 steel paid \$13 for the same grade last week, causing the prime grades to recede \$1 and the rest of the list 50c. There had been no mill sale in the interim, but broker offers last week had paved the way for an indicated decline. Based on broker offers at Pittsburgh, No. 1 steel is down 75c., although there have been no new sales into consumption. Philadelphia prices are also weaker, though export activity is still lending considerable support to the domestic market. As a result of these declines, THE IRON AGE composite price for No. 1 is down 66c. from \$15.08 to \$14.42, representing the sharpest decline that has taken place since October, 1937, and bringing the average on a parity with that prevailing on Nov. 1, 1938. Price movements in the last year have been at a much slower rate.

Other markets reflect the general bearish sentiment. No. 1 at Buffalo is down 50c. sentimentally, and dealer buying prices at Detroit, Cincinnati and St. Louis are generally lower by 50c. on the average. Prices for both domestic and foreign delivery are easier at Boston, although export buying prices are unchanged at New York and Philadelphia.

Pittsburgh

The market is definitely weaker this week with little or no buying on the part of either brokers or consumers. Some steel companies have been offered tonnages of No. 1 heavy melting steel at \$15.25 and in exceptional cases smaller lots have been offered for as low as \$15 a ton. In neither case were the mills interested. Broker buying for other points in the district is being made at \$15 a ton for No. 1 heavy melting, with moderate-sized tonnages having been picked up at this price. Another factor tending toward weakness is that most brokers have cleaned up shortages and little or no business is outstanding. An appraisal of all these factors warrants a quotation for No. 1 heavy melting steel of \$14.75 to \$15.25, off 75c. from last week. Railroad heavy melting is also weaker, being quotable at \$15.75 to \$16.25.

Chicago

A sale at \$13 a gross ton delivered to a local mill has caused a reduction in the price of heavy melting steel of \$1 a ton, to \$12.50 to \$13. The purchase is believed

to have involved from 15,000 to 20,000 tons. Covering is proceeding at \$12.75 to \$12.50, mostly on the former basis. The last mill sale in this district was \$14.50 to the same producer. The market already has fallen back into the stupor of the past several weeks.

Philadelphia

With domestic demand extremely limited, the market here is developing an easier undertone price-wise. Moderate tonnages of No. 1 and No. 2 steels have been added to outstanding domestic contracts at prices that warrant a reduction in published quotations. Hydraulic compressed bundles (old) have been marked down to \$11 to \$11.50 on the basis of several small sales, and small lots of machine shop turnings and cast iron carwheels have been disposed of at slightly lower prices. Two factors are working here, however, to prevent serious weakness in the market; that is, the total absence of distress material and the constant flow of processed scrap to Port Richmond for export. Prices for export have not changed, but the maximum levels are none too easy to secure and a 50c. mark-down soon is quite likely.

Cleveland

The market here is neither worse nor better this week. Only a moderate amount of activity is noted, mostly in connection with previous orders or from dealer to dealer. All signs point to a quiet period during the remainder of April, with mill buying unlikely. No. 1 heavy melting steel is quoted at \$14 to \$14.50 per ton.

Youngstown

Mill operations are reduced and scrap is a little more plentiful this week, but on the whole the market is marking time, with No. 1 heavy melting quoted at \$14.50 to \$15 per ton.

Buffalo

Although no large sales of No. 1 heavy melting steel have taken place recently, the price is down 50c. this week. Sales of bundles and busheling during the past month have been at figures, which, if the usual differential were applied, would indicate a price of \$13.50 to \$14 for No. 1. Allied grades are affected, as usual, by the differential. The general tone of the market is weak.

St. Louis

No sizable purchase of scrap iron has been made by steel mills in the St. Louis district for 10 weeks, and because inventories have been reduced in that time, dealers feel that there will be a buying movement within the next two weeks. Meantime, the market is dull, and prices are nominal. No. 2 heavy melting is 25c. a ton lower and No. 1 machinery cast and

No. 1 railroad cast. 50c. lower. Railroad lists: Southern, 8000 tons; Missouri-Kansas-Texas, 375 tons; Chicago, Milwaukee, St. Paul & Pacific, 150 tons.

Cincinnati

The old materials market is definitely weaker under war scare influence. Dealers bids are off 25c. to 50c. with little trading reported. Regular consumption under mill-dealer yearly arrangement is at less than open-hearth requirements, as mills reduce inventory. Yard supplies are good, but dealers are piling only what they have to take from regular sources.

Detroit

The only reported sale in the Detroit scrap market during the past week was the April 15 list of a body company, said to have brought approximately \$11.50 a ton for the hydraulic bundles, a local broker having made the purchase. Aside from this, there has been very little offering of scrap and no offers to buy. Scrap output from smaller plants is reduced in quantity, but is proving a burden to dealers who have no immediate outlet for it.

New York

As indicated last week a stabilized condition has been set up in the export market as determined by the continuation of orders at the previous price levels. With the critical situation abroad, brokers are simply sitting tight, unwilling to gamble on the possible effects of a European war on a large scale. Domestic prices are also static, with little material moving into consumption.

Boston

Prices for both domestic and foreign delivery are easier, and business is tapering off with current transactions at the lowest level in months. Weirton buyers of skeleton have dropped bids an additional 35c. a ton, making the net decline the past fortnight about 60c. The top price exporters will now pay for No. 1 steel is \$13.75 a ton, delivered dock, and the top for No. 2 steel is \$12.75, a decline of 25c. a ton. A boat left here April 14 with approximately 6500 tons of scrap for Italy, having loaded about 3000 tons at Providence. Previously a boat with 4226 tons sailed for England, and another with 5659 tons for Japan.

Toronto

The advance of 25c. per ton in all iron and steel scrap materials last week stimulated offerings and dealers state that there has been a heavy flow of scrap into yards during the week. Most of the material coming in, however, is automobile scrap, with boiler plate and sheet scrap also more plentiful on the market. Heavy melting steel continues in limited supply insofar as No. 1 grade is concerned, but No. 2 grade is fairly plentiful in the way of hydraulic bundles. Machinery cast containing automobile blocks and other secondary materials also has increased in dealers' yards, but supplies still are below requirements. Most local dealers are stocking up with scrap in anticipation of heavier resale demand in the early future. Consumers demanding No. 1 cast scrap are obtaining supplies direct from the railroads and it is stated that dealers are out of this material at this time.

Iron and Steel Scrap Prices

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	\$14.75 to \$15.25
Railroad hvy. mltng.	15.75 to 16.25
No. 2 hvy. mltng. steel.	13.50 to 14.00
Scrap rails	16.00 to 16.50
Rails 3 ft. and under.	18.25 to 18.75
Comp. sheet steel	15.50 to 16.00
Hand bundled sheets.	14.50 to 15.00
Hvy. steel axle turn.	13.25 to 13.75
Machine shop turn.	9.50 to 10.00
Short shov. turn.	10.50 to 11.00
Mixed bor. & turn.	8.75 to 9.25
Cast iron borings	8.75 to 9.25
Cast iron carwheels.	15.00 to 15.50
Hvy. breakable cast.	12.50 to 13.00
No. 1 cupola cast.	15.00 to 15.50
RR. knuckles & cplrs.	17.50 to 18.00
Rail coll & leaf springs	18.00 to 18.50
Rolled steel wheels.	18.00 to 18.50
Low phos. billet crops.	19.00 to 19.50
Low phos. punchings.	17.50 to 18.00
Low phos. plate	16.50 to 17.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	\$15.00
No. 2 hvy. mltng. steel.	13.50
Hydraulic bund., new.	\$14.50 to 15.00
Hydraulic bund., old.	11.00 to 11.50
Steel rails for rolling.	17.00 to 17.50
Cast iron carwheels.	16.00 to 16.50
Hvy. breakable cast.	15.00 to 15.50
No. 1 cast	16.50 to 17.00
Stove plate (steel wks.)	13.00 to 13.50
Railroad malleable	15.50 to 16.00
Machine shop turn.	9.00 to 9.50
No. 1 blast furnace	6.50 to 7.00
Cast borings	6.50 to 7.00
Heavy axle turnings.	10.00 to 10.50
No. 1 low phos. hvy.	17.50 to 18.00
Couplers & knuckles.	17.50 to 18.00
Rolled steel wheels.	17.50 to 18.00
Steel axles	20.00 to 20.50
Shafting	20.50 to 21.00
Spec. iron & steel pipe	12.00 to 12.50
No. 1 forge fire.	12.00 to 12.50
Cast borings (chem.)	9.50 to 10.00

CHICAGO

Delivered to Chicago district consumers:

Per Gross Ton	
Hvy. mltng. steel	\$12.50 to \$13.00
Auto. hvy. mltng. steel alloy free	11.50 to 12.00
No. 2 auto steel	10.50 to 11.00
Shoveling steel	13.00 to 13.50
Factory bundles	12.00 to 12.50
Dealers' bundles	11.50 to 12.00
Drop forge flashings.	9.50 to 10.00
No. 1 busheling	11.50 to 12.00
No. 2 busheling, old.	5.25 to 5.75
Rolled carwheels	14.50 to 15.00
Railroad tires, cut	14.50 to 15.00
Railroad leaf springs.	14.50 to 15.00
Steel coup. & knuckles	14.50 to 15.00
Axle turnings	12.00 to 12.50
Coil springs	16.00 to 16.50
Axle turn. (elec.)	13.50 to 14.00
Low phos. punchings.	15.50 to 16.00
Low phos. plates 12 in. and under	15.00 to 15.50
Cast iron borings	5.00 to 5.50
Short shov. turn	7.00 to 7.50
Machine shop turn.	6.50 to 7.00
Rerolling rails	16.50 to 17.00
Steel rails under 3 ft.	15.50 to 16.00
Steel rails under 2 ft.	16.00 to 16.50
Angle bars, steel	15.00 to 15.50
Cast iron carwheels	12.25 to 12.75
Railroad malleable	14.50 to 15.00
Agric. malleable	10.75 to 11.25

Per Net Ton

Iron car axles	\$18.00 to \$18.50
Steel car axles	17.50 to 18.00
Locomotive tires	13.00 to 13.50
Pipes and flues	8.50 to 9.00
No. 1 machinery cast.	11.50 to 12.00
Clean auto. cast	12.00 to 12.50
No. 1 railroad cast.	10.50 to 11.00
No. 1 agric. cast.	9.00 to 9.50
Stove plate	7.00 to 7.50
Grate bars	8.00 to 8.50
Brake shoes	8.50 to 9.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	\$14.50 to \$15.00
No. 2 hvy. mltng. steel.	13.50 to 14.00
Low phos. plate	15.50 to 16.00
No. 1 busheling	13.75 to 14.25
Hydraulic bundles	14.00 to 14.50
Machine shop turn.	9.50 to 10.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	\$14.00 to \$14.50
No. 2 hvy. mltng. steel.	13.00 to 13.50
Comp. sheet steel	13.50 to 14.00
Light bund. stampings	10.25 to 10.75
Drop forge flashings.	13.00 to 13.50
Machine shop turn.	7.50 to 8.00
Short shov. turn.	8.00 to 8.50
No. 1 busheling	13.50 to 14.00
Steel axle turnings.	11.50 to 12.00
Low phos. billet and bloom crops	18.00 to 18.50
Cast iron borings	8.00 to 8.50
Mixed bor. & turn.	8.00 to 8.50
No. 2 busheling	8.00 to 8.50
No. 1 cupola cast.	15.50 to 16.00
Railroad grate bars	9.50 to 10.00
Stove plate	9.75 to 10.25
Rails under 3 ft.	17.75 to 18.25
Rails for rolling	18.00 to 18.50
Railroad malleable	15.50 to 16.00
Cast iron carwheels	14.00 to 14.50

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	\$13.50 to \$14.00
No. 2 hvy. mltng. steel.	11.50 to 12.00
Scrap rails	15.00 to 15.50
New hvy. b'ndled sheets	11.50 to 12.00
Old hydraul. bundles.	10.25 to 10.75
Drop forge flashings.	11.50 to 12.00
No. 1 busheling	11.50 to 12.00
Hvy. axle turnings.	10.50 to 11.00
Machine shop turn.	6.50 to 7.00
Knuckles & couplers.	16.50 to 17.00
Coil & leaf springs.	16.50 to 17.00
Rolled steel wheels.	16.00 to 16.50
Low phos. billet crops.	15.50 to 16.00
Shov. turnings	8.75 to 9.25
Mixed bor. & turn.	7.50 to 8.00
Cast iron borings	7.50 to 8.00
Steel car axles	16.50 to 17.00
No. 1 machinery cast.	15.00 to 16.00
No. 1 cupola cast.	14.50 to 15.00
Stove plate	13.00 to 13.50
Steel rails under 3 ft.	18.00 to 18.50
Cast iron carwheels.	13.50 to 14.00
Railroad malleable	15.00 to 15.50
Chemical borings	9.00 to 9.50

ST. LOUIS

Dealers' buying prices per gross ton delivered to consumer:

Selected hvy. melting.	\$12.00 to \$12.50
No. 1 hvy. melting.	11.50 to 12.00
No. 2 hvy. melting.	10.75 to 11.25
No. 1 locomotive tires.	13.00 to 13.50
Misc. stand. sec. rails.	13.00 to 13.50
Railroad springs	14.00 to 14.50
Bundled sheets	7.00 to 7.50
No. 1 busheling	7.50 to 8.00
Cast. bor. & turn.	2.50 to 3.00
Machine shop turn.	3.50 to 4.00
Heavy turnings	9.00 to 9.50
Rails for rolling	16.00 to 16.50
Steel car axles	17.00 to 17.50
No. 1 RR. wrought.	10.25 to 10.75
No. 2 RR. wrought.	12.00 to 12.50
Steel rails under 3 ft.	16.00 to 16.50
Steel angle bars	13.00 to 13.50
Cast iron carwheels.	14.50 to 15.00
No. 1 machinery cast.	13.50 to 14.00
Railroad malleable	12.25 to 12.75
No. 1 railroad cast.	12.00 to 12.50
Stove plate	7.50 to 8.00
Grate bars	8.50 to 9.00
Brake shoes	9.50 to 10.00

CINCINNATI

Dealers' buying prices per gross ton at yards:

No. 1 hvy. mltng. steel.	\$11.00 to \$11.50
No. 2 hvy. mltng. steel.	8.75 to 9.25
Scrap rails for mltng.	14.50 to 15.00
Loose sheet clippings.	6.50 to 7.00
Hydrau. b'ndled sheets	10.75 to 11.25
Cast iron boring	3.00 to 3.50
Machine shop turn.	4.50 to 5.00
No. 1 busheling	7.00 to 7.50
No. 2 busheling	2.00 to 2.50
Rails for rolling	16.50 to 17.00
No. 1 locomotive tires.	13.25 to 13.75
Short rails	17.25 to 17.75
Cast iron carwheels.	12.25 to 12.75
No. 1 machinery cast.	13.00 to 13.50
No. 1 railroad cast.	11.75 to 12.25
Burnt cast	6.00 to 6.50
Stove plate	6.00 to 6.50
Agricul. malleable	10.75 to 11.25
Railroad malleable	13.25 to 13.75
Mixed hvy. cast	10.00 to 10.50

BIRMINGHAM

Per gross ton delivered to consumer:

Hvy. melting steel.	\$12.50 to \$14.00
Scrap steel rails	14.50 to 15.00
Short shov. turnings.	7.50 to 8.10
Stove plate	9.00 to 10.00
Steel axles	15.00 to 16.00
Iron axles	15.00 to 16.00
No. 1 RR. wrought	10.00
Rails for rolling	16.00 to 16.50
No. 1 cast	14.50
Tramcar wheels	14.00

DETROIT

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. indus-trial steel	\$10.00 to \$10.50
No. 2 hvy. mltng. steel.	8.50 to 9.00
Borings and turnings.	5.75 to 6.25
Long turnings	5.00 to 5.50
Short shov. turnings.	6.00 to 6.50
No. 1 machinery cast.	12.50 to 13.00
Automotive cast	13.00 to 13.50
Hvy. breakable cast.	9.00 to 9.50
Stove plate	7.50 to 8.00
Hydraul. comp. sheets.	11.00 to 11.50
New factory bushel.	10.00 to 10.50
Sheet clippings	7.25 to 8.25
Flashings	9.00 to 9.50
Low phos. plate scrap.	11.00 to 11.50

NEW YORK

Dealers' buying prices per gross ton on cars:

No. 1 hvy. mltng. steel.	\$11.00 to \$11.50
No. 2 hvy. mltng. steel.	9.50 to 10.00
Hvy. breakable cast.	10.50 to 11.00
No. 1 machinery cast.	11.50 to 12.00
No. 2 cast	9.50 to 10.00
Stove plate	9.50 to 10.00
Steel car axles	20.00 to 20.50
Shafting	15.50 to 16.00
No. 1 RR. wrought.	11.00 to 11.50
No. 1 wrought long.	9.50 to 10.00
Spec. iron & steel pipe	9.00 to 9.50
Rails for rolling	16.00 to 16.50
Clean steel turnings*	4.00 to 4.50
Cast borings*	3.50 to 4.00
No. 1 blast furnace.	3.50 to 4.00
Cast borings (chem.)	9.50 to 10.00
Unprepared yard scrap	6.00 to 6.50
Light iron	3.00 to 3.50
Per gross ton, delivered local foundries:	
No. 1 machn. cast.	\$13.50 to \$14.00
No. 2 cast	10.50 to 11.00

* \$1.50 less for truck loads.

† Northern N. J. prices are \$2 to \$2.50 higher

BOSTON

Dealers' buying prices per gross ton:

Breakable cast	\$10.15
Machine shop turn.	\$3.38 to \$4.15
Mixed bor. & turn.	\$2.00 to 2.25
Bun. skeleton long.	7.90
Shafting	15.50 to 15.65
Cast bor. chemical.	4.50 to 5.00
Per gross ton delivered consumers' yards:	
Textile cast	\$12.50 to \$14.00
No. 1 machine cast.	12.50 to 14.00
Per gross ton delivered dealers' yards:	
No. 1 hvy. mltng. steel.	\$11.50 to \$11.75
No. 2 steel	10.00 to 10.25

PACIFIC COAST

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	\$12.50 to \$14.00
No. 2 hvy. mltng. steel.	11.50 to 13.00

CANADA

Dealers' buying prices at their yards.

per gross ton:	
Toronto Montreal	
No. 1 hvy. mltng. steel.	\$10.00 \$9.50
No. 2 hvy. mltng. steel.	8.50 8.00
Mixed dealers steel.	7.25 6.75
Drop forge flashings.	9.25 8.75
New loose clippings.	4.75 4.25
Busheling	4.50 4.00
Scrap pipe	5.75 5.25
Steel turnings	5.25 4.75
Cast borings	4.00 3.50
Machinery cast	15.25 14.25
Dealers cast	13.25 12.25
Stove plate	11.25 10.25

EXPORT

Dealers' buying prices per gross ton:

New York, truck lots, delivered, barges	
No. 1 hvy. mltng. steel.	\$12.00 to \$12.50
No. 2 hvy. mltng. steel.	10.50 to 11.00
No. 2 cast	10.50 to 11.00
Stove plate	9.50 to 10.00
Boston on cars at Army Base or Mystic Wharf	
No. 1 hvy. mltng. steel.	\$13.50 to \$13.75
No. 2 hvy. mltng. steel.	12.50 to 12.75
Rails (scrap)	13.50 to 13.75
Mixed textile and machinery cast	12.00
Philadelphia, delivered alongside boats, Port Richmond	
No. 1 hvy. mltng. steel.	\$15.00 to \$15.50
No. 2 hvy. mltng. steel.	13.50 to 14.00

PRICES ON FINISHED AND SEMI-FINISHED IRON AND STEEL

Steel prices on these pages are base prices only and f.o.b. mill unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, deductions, and in most cases the amount of freight which must be absorbed in order to meet competition.

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Rerolling only). Prices delivered Detroit are \$2 higher. F.o.b. Duluth, billets only, \$2 higher.

Per Gross Ton
Rerolling \$34.00
Forging quality 40.00

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

Per Gross Ton
Open hearth or bessemer \$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

Per Lb.
Grooved, universal and sheared 1.90c.

Wire Rods

(No. 5 to 9/32 in.)

Per Gross Ton
Pittsburgh, Chicago or Cleveland \$43.00
Worcester, Mass. 45.00
Birmingham 43.00
San Francisco 52.00
Rods over 9/32 in. or 47/64 in., inclusive, \$5 a ton over base.

SOFT STEEL BARS

Base per Lb.
Pittsburgh, Chicago, Gary, Cleveland, Buffalo and Birmingham 2.25c.
Detroit, delivered 2.35c.
Duluth 2.35c.
Philadelphia, delivered 2.57c.
New York 2.59c.
On cars dock Gulf ports 2.60c.
On cars dock Pacific ports 2.85c.

RAIL STEEL BARS

(For merchant trade)

Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham 2.10c.
On cars dock Tex. Gulf ports 2.45c.
On cars dock Pacific ports 2.70c.

BILLET STEEL REINFORCING BARS

(Straight lengths as quoted by distributors)

Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Cleveland, Youngstown or Sparrows Pt. 1.90c. to 2.05c.
Detroit, delivered 2.00c. to 2.15c.
On cars dock Tex. Gulf ports 2.25c. to 2.40c.
On cars dock Pacific ports 2.50c.

RAIL STEEL REINFORCING BARS

(Straight lengths as quoted by distributors)

Pittsburgh, Chicago, Gary, Buffalo, Cleveland, Youngstown or Birmingham 1.75c. to 1.90c.
Detroit, delivered 1.85c. to 2.00c.
On cars dock Tex. Gulf ports 2.10c. to 2.25c.
On cars dock Pacific ports 2.35c.
Prices on reinforcing bars have been subject to concessions of \$3 a ton or more from above quotations.

IRON BARS

Chicago and Terre Haute 2.15c.
Pittsburgh (refined) 3.60c.

COLD FINISHED BARS AND SHAFTING*

Base per Lb.
Pittsburgh, Buffalo, Cleveland, Chicago and Gary 2.70c.
Detroit 2.75c.

* In quantities of 10,000 to 19,999 lb.

PLATES

Base per Lb.

Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Claymont, Del. 2.10c.
Philadelphia, del'd 2.15c.
New York, del'd 2.29c.
On cars dock Gulf ports 2.45c.
On cars dock Pacific ports 2.60c.
Wrought iron plates, P'tg. 3.80c.

FLOOR PLATES

Pittsburgh or Chicago 3.35c.
New York, del'd 3.71c.
On cars dock Gulf ports 3.70c.
On cars dock Pacific ports 3.95c.

STRUCTURAL SHAPES

Base per Lb.

Pittsburgh, Chicago, Gary, Buffalo, Bethlehem or Birmingham 2.10c.
Philadelphia, del'd 2.215c.
New York, del'd 2.27c.
On cars dock Gulf ports 2.45c.
On cars dock Pacific ports 2.70c.

STEEL SHEET PILING

Base per Lb.

Pittsburgh, Chicago or Buffalo 2.40c.
On cars dock Gulf ports 2.85c.
On cars dock Pacific ports 2.90c.

RAILS AND TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., per gross ton \$40.00
Angle bars, per 100 lb. 2.70

F.o.b. Basing Points

Light rails (from billets) per gross ton \$40.00
Light rails (from rail steel) per gross ton 39.00

Base per Lb.

Cut spikes 3.00c.
Screw spikes 4.55c.
Tie plates, steel 2.15c.
Tie plates, Pacific Coast ports. 2.25c.
Track bolts, to steam railroads 4.15c.
Track bolts to jobbers, all sizes (per 100 counts) 65-5

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa., Buffalo; on spikes alone, Youngstown, Lebanon, Pa., Richmond, Va.

SHEETS

Hot Rolled

Base per Lb.

Pittsburgh, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown or Chicago 2.15c.
Detroit, delivered 2.25c.
Philadelphia, delivered 2.32c.
Granite City 2.25c.
On cars dock Pacific ports 2.65c.
Wrought iron, Pittsburgh 4.25c.

Cold Rolled*

Pittsburgh, Gary, Buffalo, Youngstown, Cleveland, Middletown or Chicago 3.20c.
Detroit, delivered 3.30c.
Granite City 3.30c.
Philadelphia, delivered 3.52c.
On cars dock Pacific ports 3.80c.

* Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base.

Galvanized Sheets, 24 Gage

Pittsburgh, Chicago, Gary, Sparrows Point, Buffalo, Middletown, Youngstown or Birmingham 3.50c.
Philadelphia, del'd 3.67c.
Granite City 3.60c.
On cars dock Pacific ports 4.00c.
Wrought iron Pittsburgh 6.10c.

Electrical Sheets

(F.o.b. Pittsburgh)

Base per Lb.

Field grade 3.20c.
Armature 3.55c.
Electrical 4.05c.
Motor 4.95c.
Dynamo 5.65c.
Transformer 72 6.15c.
Transformer 65 7.15c.
Transformer 58 7.65c.
Transformer 52 8.45c.

Silicon Strip in coils—Sheet price plus silicon sheet extra width extra plus 25c per 100 lb. for coils. Pacific ports add 70c. a 100 lb.

Long Ternes

No. 24 unassorted 8-lb. coating f.o.b. Pittsburgh or Gary 3.95c.
F.o.b. cars dock Pacific ports, 4.65c.

Vitreous Enameling Stock, 20 Gage*

Pittsburgh, Chicago, Gary, Youngstown, Middletown or Cleveland 3.35c.
Detroit, del'd 3.45c.
Granite City 3.45c.
On cars dock Pacific ports 3.95c.

TIN MILL PRODUCTS

*Tin Plate

Per Base Box

Standard cokes, Pittsburgh, Chicago and Gary \$5.00
Standard cokes, Granite City 5.10

* Prices effective Nov. 10 on shipments through first quarter of 1939.

Special Coated Manufacturing Ternes

Per Base Box

Granite City \$4.40
Pittsburgh or Gary 4.30

Roofing Terne Plate

(F.o.b. Pittsburgh)

(Per Package, 112 sheets, 20 x 28 in.)
8-lb. coating I.C. \$12.00
15-lb. coating I.C. 14.00
20-lb. coating I.C. 15.00
25-lb. coating I.C. 16.00
30-lb. coating I.C. 17.25
40-lb. coating I.C. 19.50

Black Plate, 29 gage and lighter

Pittsburgh, Chicago and Gary 3.05c.
Granite City 3.15c.
On cars dock Pacific ports, boxed 4.00c.

HOT ROLLED STRIP

(Widths up to 12 in.)

Base per Lb.

Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown or Birmingham 2.15c.
Detroit, delivered 2.25c.

Cooperage Stock

Pittsburgh & Chicago 2.25c.

COLD ROLLED STRIP*

Base per Lb.

Pittsburgh, Youngstown or Cleveland 2.95c.
Chicago 3.05c.
Detroit, delivered 3.05c.
Worcester 3.15c.

* Carbon 0.25 and less.

Commodity Cold Rolled Strip

Pittsburgh, Youngstown, or Cleveland 3.10c.
Detroit, delivered 3.20c.
Worcester 3.50c.

COLD ROLLED SPRING STEEL

Pittsburgh

and

Cleveland Worcester

Carbon 0.26-0.50% 2.95c. 3.15c.
Carbon 0.51-0.75 4.30c. 4.50c.
Carbon 0.76-1.00 6.15c. 6.35c.
Carbon 1.01-1.25 8.35c. 8.55c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh, Chicago, Cleveland and Birmingham)

To Manufacturing Trade

	Per Lb.
Bright wire	2.60c.
Galvanized wire, base	2.65c.*
Spring wire	3.20c.

* On galvanizing wire to manufacturing trade, size and galvanizing extras are charged, the price Nos. 6 to 9 gage, inclusive, thus being 3.15c.

To the Trade

	Base per Keg
Standard wire nails	\$2.45
Coated nails	2.45
Cut nails, carloads	3.60

	Base per 100 Lb.
Annealed fence wire	\$2.95
Galvanized fence wire	3.35
Polished staples	3.15
Galvanized staples	3.40
Twisted barbless wire	3.30
Woven wire fence, base column	67
Single loop bale ties, base col.	56
Stand. 2 pt., 12.5 gage barbed	
cattle wire, per 80 rod spool	\$2.32
Stand. 2 pt., 12.5 gage barbed	
hog wire, per 80 rod spool	\$2.80

Note: Birmingham base same on above items, except spring wire.

Add \$4 a ton for Mobile, Ala.; \$5 for New Orleans; \$6 for Lake Charles to above bases, except on galvanized and annealed merchant fence wire, which are \$1 a ton additional in each case.

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills
F.o.b. Pittsburgh only on wrought iron pipe.

In.	Steel Black Galv.	Wrought Iron Black Galv.
1/8	56 36	1/8 & 3/8 +9 +30
1/4	59 43 1/2	1/4 & 1/2 +24 6 1/2
3/8	63 1/2 54	3/8 & 3/4 +30 13
1/2	66 1/2 58	1 & 1 1/4 34 19
3/4	68 1/2 60 1/2	1 1/2 & 2 +38 21 1/2
1 to 3	68 1/2 60 1/2	2 & 2 1/2 +37 1/2 21

In.	Lap Weld	Wrought Iron
2	61 52 1/2	2 & 2 1/2 +30 1/2 15
2 1/2 & 3	64 55 1/2	2 1/2 to 3 1/2 31 1/2 17 1/2
3 1/2 to 6	66 57 1/2	4 & 4 1/2 +33 1/2 21
7 & 8	65 55 1/2	4 1/2 to 8 3/2 20
9 & 10	64 1/2 55	9 to 12 +28 1/2 15
11 & 12	63 1/2 54	

In.	Butt weld, extra strong, plain ends	Wrought Iron
1/8	54 1/2 41 1/2	1/8 & 3/8 +10 +43
1/4	56 1/2 45 1/2	1/4 & 1/2 +25 9
3/8	61 1/2 37 1/2	3/8 & 3/4 +31 15
1/2	65 1/2 57 1/2	1 to 2 +38 22 1/2
3/4	65 1/2 57 1/2	
1 to 3	67 60	

In.	Lap weld, extra strong, plain ends	Wrought Iron
2	59 51 1/2	2 & 2 1/2 +33 1/2 18 1/2
2 1/2 & 3	63 55 1/2	2 1/2 to 4 39 1/2 25 1/2
3 1/2 to 6	66 1/2 59	4 1/2 to 6 37 1/2 24
7 & 8	65 1/2 56	7 & 8 +38 1/2 24 1/2
9 & 10	64 1/2 55	9 to 12 +32 20 1/2
11 & 12	63 1/2 54	

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or \$4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or \$2 a ton higher, on all butt weld 8 in. and smaller.

Boiler Tubes

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall. (Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots)

	Seamless Cold Drawn	Lap Weld Hot Rolled
1 in. o.d.	13 B.W.G. \$ 9.01	\$ 7.82
1 1/4 in. o.d.	13 B.W.G. 10.67	9.26
1 1/2 in. o.d.	13 B.W.G. 11.70	10.23
1 3/4 in. o.d.	13 B.W.G. 13.42	11.64
2 in. o.d.	13 B.W.G. 15.03	13.04
2 1/4 in. o.d.	13 B.W.G. 16.76	14.54
2 1/2 in. o.d.	12 B.W.G. 18.45	16.01
2 3/4 in. o.d.	12 B.W.G. 20.21	17.54
3 in. o.d.	12 B.W.G. 21.42	18.59
3 1/4 in. o.d.	12 B.W.G. 22.48	19.50
3 1/2 in. o.d.	11 B.W.G. 28.37	24.62
4 in. o.d.	10 B.W.G. 35.20	30.54
4 1/2 in. o.d.	10 B.W.G. 43.04	37.35
5 in. o.d.	9 B.W.G. 54.01	46.87
6 in. o.d.	7 B.W.G. 82.93	71.96

Extras for less carload quantities:

	Base	5%	10%	20%	30%	45%	65%
40,000 lb. or ft. over							
30,000 lb. or ft. to 39,999 lb. or ft.							
20,000 lb. or ft. to 29,999 lb. or ft.							
10,000 lb. or ft. to 19,999 lb. or ft.							
5,000 lb. or ft. to 9,999 lb. or ft.							
2,000 lb. or ft. to 4,999 lb. or ft.							
Under 2,000 lb. or ft.							

CAST IRON WATER PIPE

	Per Net Ton
*6-in. and larger, del'd Chicago	\$51.00
6-in. and larger, del'd New York	49.00
*6-in. and larger, Birmingham	43.00
6-in. and larger, f.o.b. dock, San Francisco or Los Angeles	52.00
F.o.b. dock, Seattle	52.00
4-in. f.o.b. dock, San Francisco or Los Angeles	55.00
F.o.b. dock, Seattle	52.00

Class "A" and gas pipe, \$3 extra 4-in. pipe is \$3 a ton above 6-in.

Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is \$42, Birmingham, and \$50 delivered Chicago and 4-in. pipe, \$45, Birmingham, and \$54 delivered Chicago.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland Birmingham or Chicago)

	Per Cent Off List
Machine and carriage bolts:	
1/2 in. & 6 in. and smaller	68 1/2
Larger and longer up to 1 in.	66
1 1/2 in. and larger	64
Lag bolts	66
Plow bolts, Nos. 1, 2, 3 and 7	68 1/2
Hot pressed nuts, and c.p.c. and t-nuts, square or hex. blank or tapped:	
1/2 in. and smaller	67
9/16 in. to 1 in. inclusive	64
1 1/2 in. and larger	62

On the above items with the exception of plow bolts, there is an additional allowance of 10 per cent for full container quantities.

On all of the above items, there is an additional 5 per cent allowance for carload shipments.

Semi-fin. hexagon nuts U.S.S. S.A.E.	
1/2 in. and smaller	67 70
9/16 to 1 in.	64 65
1 1/2 in. and larger	62 62

In full container lots, 10 per cent additional discount.

Stove bolts in packages, nuts attached	
	72 1/2
Stove bolts in packages, with nuts separate	
	72 1/2 and 12 1/2
Stove bolts in bulk	
	84

On stove bolts freight is allowed to destination on 200 lb. and over.

Large Rivets

(1/2 in. and larger)

	Base Per 100 Lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	\$3.40

Small Rivets

(7/16 in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland Chicago, Birmingham	65 and 10

Cap and Set Screws

(Freight allowed to destination)

	Per Cent Off List
Milled hexagon head, cap screws, 1 in. dia. and smaller	50 and 10
Milled headless set screws, cut thread 1/4 in. and smaller	70
Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller	67 1/2
Upset set screws, cup and oval points	75
Milled studs	60

Alloy and Stainless Steel

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Base price, \$56.00 a gross ton.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.
Open-hearth grade, base2.80c.
Delivered, Detroit2.90c.

S.A.E. Series	Alloy Differential
Numbers	per 100 Lb.
200 (1 1/2% Nickel)	\$0.35

2100 (1 1/2% Nickel)	\$0.75
2300 (3 1/2% Nickel)	1.55
2500 (5% Nickel)	2.25
3100 Nickel-chromium	0.70
3200 Nickel-chromium	1.35
3300 Nickel-chromium	3.80
3400 Nickel-chromium	3.20
4100 Chromium-molybdenum (0.15 to 0.25 Molybdenum)	0.55
4100 Chromium-molybdenum (0.25 to 0.40 Molybdenum)	0.75
4600 Nickel - molybdenum (0.20 to 0.30 Mo. 1.50 to 2.00 Ni.)	1.10
5100 Chrome steel (0.60-0.90 Cr.)	0.35
5100 Chrome steel (0.80-1.10 Cr.)	0.45
5100 Chromium spring steel	0.15
6100 Chromium-vanadium bar	1.20
6100 Chromium-vanadium spring steel	0.85
Chromium-nickel vanadium	1.50
Carbon-vanadium	0.85

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2 1/4 in. thick or over take the billet base.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.40c. base per lb. Delivered Detroit, 3.50c., carlots.

CORROSION & HEAT RESISTANT ALLOYS

(Base prices, cents per lb., f.o.b. Pittsburgh)

	Chrome-Nickel	No. 304	No. 302
Forging billets	21.25c.	20.40c.	
Bars	25c.	24c.	
Plates	29c.	27c.	
Structural shapes	25c.	24c.	
Sheets	36c.	34c.	
Hot-rolled strip	23.50c.	21.50c.	
Cold-rolled strip	30c.	28c.	
Drawn wire	25c.	24c.	

	Straight Chrome	No.	No.	No.
		410	430	442
Bars	18.50c.	19c.	22.50c.	27.50c.
Plates	21.50c.	22c.	25.50c.	30.50c.
Sheets	26.50c.	29c.	32.50c.	36.50c.
Hot Strip	17c.	17.50c.	23c.	28c.
Cold stp.	22c.	22.50c.	28.50c.	36.50c.

TOOL STEEL

High speed	67c.
High-carbon-chrome	43c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

British and Continental

BRITISH

Per Gross Ton
f.o.b. United Kingdom Ports

Ferromanganese, export	Nominal
Tin plate, per base box	20s. 3d.
Steel bars, open hearth	£10 8s.
Beams, open-hearth	£10
Channels, open hearth	£10 5s.
Angles, open-hearth	£10
Black sheets, No. 24 gage	£13
Galvanized sheets, No. 24 gage	£15 15s.

CONTINENTAL

Per Gross Ton, Gold £.
f.o.b. Continental Ports

Billets, Thomas	Nominal
Wire rods, No. 5 B.W.G.	£5 10s.
Steel bars, merchant	£5 5s.
Sheet Bars	Nominal
Plate 1/4 in. and up	£5 7s.
Plate 3/16 in. and 5 mm.	£5 13s.
Sheets 1/4 in.	£5 9s. 6d.
Beams, Thomas	£4 18s.
Angles (Basic)	£4 18s.
Hoops and strip, base	£5 12s.

RAW MATERIALS PRICES

PIG IRON

No. 2 Foundry

F.o.b. Everett, Mass.	\$22.00
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa., and Sparrows Point, Md.	22.00
Delivered Brooklyn	24.50
Delivered Newark or Jersey City	23.53
Delivered Philadelphia	22.84
F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City, Cleveland and Youngstown	21.00
F.o.b. Buffalo	21.00
F.o.b. Detroit	21.00
Southern, delivered Cincinnati	21.06
Northern, delivered Cincinnati	21.44
F.o.b. Duluth	21.50
F.o.b. Provo, Utah	19.00
Delivered, San Francisco, Los Angeles or Seattle	24.50
F.o.b. Birmingham*	17.38

* Delivered prices on southern iron for shipment to northern points are 38c. a ton below delivered prices from nearest northern basing point on iron with phosphorus content of 0.70 per cent and over.

Malleable

Base prices on malleable iron are 50c. a ton above No. 2 foundry quotations at Everett, Eastern Pennsylvania furnaces, Erie and Buffalo. Elsewhere they are the same, except at Birmingham and Provo, which are not malleable iron basing points.

Basic

F.o.b. Everett, Mass.	\$21.50
F.o.b. Bethlehem, Birdsboro, Swedeland and Steelton, Pa., and Sparrows Point, Md.	21.50
F.o.b. Buffalo	20.00
F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City, Cleveland and Youngstown	20.50
Delivered Philadelphia	22.34
Delivered Canton, Ohio	21.89
Delivered Mansfield, Ohio	22.44
F.o.b. Birmingham	16.00

Bessemer

F.o.b. Buffalo	\$22.00
F.o.b. Everett, Mass.	23.00
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa.	23.00
Delivered Newark or Jersey City	24.53
Erie, Pa., and Duluth	22.00
F.o.b. Neville Island, Toledo, Chicago and Youngstown	21.50
F.o.b. Birmingham	22.00
Delivered Cincinnati	22.11
Delivered Canton, Ohio	22.89
Delivered Mansfield, Ohio	23.44

Low Phosphorus

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y.	26.50
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Gray Forge

Valley or Pittsburgh furnace	\$20.50
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Charcoal

Lake Superior furnace	\$25.00
Delivered Chicago	28.34

Canadian Pig Iron

Per Gross Ton

Montreal	
Foundry Iron	\$24.50 base
Malleable	25.00 base
Basic	24.50 base
Toronto	
Foundry Iron	\$22.50 base
Malleable	23.00 base
Basic	22.50 base

On all grades 2.25 per cent silicon and under is base. For each 25 points of silicon over 2.25 per cent an extra of 25c. is charged.

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload)\$80.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%\$28.00

Domestic, 26 to 28% 33.00

Electric Ferrosilicon

Per Gross Ton Delivered;

Lump Size

50% (carload lots, bulk)\$69.50*

50% (ton lots in 50 gal. bbl.) .. 80.50*

75% (carload lots, bulk)126.00*

75% (ton lots in 50 gal. bbl.) ..139.00*

Bessemer Ferrosilicon

F.o.b. Furnace, Jackson, Ohio

Per Gross Ton

10.00 to 10.50%\$30.50

For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.

For each unit of manganese over 2%, \$1 per ton additional. Phosphorus 0.75% or over, \$1 per ton additional.

Base prices at Buffalo are \$1.25 a ton higher than at Jackson.

Silvery Iron

Per Gross Ton

F.o.b. Jackson, Ohio, 5.00 to

5.50%\$24.50

For each additional 0.5% silicon up to 12%, 50c. a ton is added. Above 12% add 75c. a ton.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are \$1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, \$1 a ton additional. Phosphorus 0.75% or over, \$1 a ton additional.

Ferrochrome

Per Lb. Contained Cr., Delivered Carlots, Lump Size, on Contract

4 to 6% carbon10.50c.*

2% carbon16.50c.*

1% carbon17.50c.*

0.10% carbon19.50c.*

0.06% carbon20.00c.*

Silico-Manganese

Per Gross Ton, Delivered, Lump Size, Bulk, on Contract

3% carbon\$83.00

2.50% carbon 88.00

2% carbon 93.00

1% carbon103.00

Other Ferroalloys

Ferrotungsten, per lb. contained W del., carloads.... \$1.75

Ferrotungsten, 100 lbs. and less 2.00

Ferrovandium, contract, per lb. contained V., delivered\$2.70 to \$2.90†

Ferrocolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y., tons lots \$2.25†

Ferrocobaltititanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace carload and contract per net ton\$142.50

Ferrocobaltititanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton\$157.50

Ferrophosphorus, electric, or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with \$3 unitage, freight equalized with Rockdale, Tenn., per gross ton\$58.50

Ferrophosphorus, electrolytic, 23-26% in car lots, f.o.b. Monsanto (Siglo), Tenn., 24%, per gross ton, \$3 unitage, freight equalized with Nashville \$75.00

Ferromolybdenum, per lb. Mo. f.o.b. furnace 95c.

Calcium molybdate, per lb. Mo. f.o.b. furnace 80c.

Molybdenum oxide briquettes 48-52% Mo; per lb. contained Mo, f.o.b. Langeloth, Pa. 80c.

* Spot prices are \$5 per ton higher.

† Spot prices are 10c. per lb. of contained element higher.

ORES

Lake Superior Ores

Delivered Lower Lake Ports

Per Gross Ton

Old range, Bessemer, 51.50%...\$5.25

Old range, non-Bessemer, 51.50% 5.10

Messabi, Bessemer, 51.50%..... 5.10

Messabi, non-Bessemer, 51.50%.. 4.95

High phosphorus, 51.50%..... 4.35

Foreign Ore

C.i.f. Philadelphia or Baltimore

Per Unit

Iron, low phos., copper free, 55 to 58% dry, Algeria 12c.

Iron, low phos., Swedish, average, 68½% iron 12c.

Iron, basic or foundry, Swedish, aver. 65% iron 11c.

Iron, basic or foundry, Russian, aver. 65% iron.....Nominal

Man., Caucasian, washed 52% 29c.

Man., African, Indian, 44-48% 25c.

Man., African, Indian, 49-51% 28c.

Man., Brazilian, 46 to 48% 27c.

Per Short Ton Unit

Tungsten, Chinese, Wolframite, duty paid, delivered\$19.25

Tungsten, domestic, scheelite delivered\$16.00 to \$18.00

Chrome or (lump) c.i.f. Atlantic Seaboard, per gross ton: South African (low grade)\$15.00

Rhodesian, 45% 19.00

Rhodesian, 48% 22.50

Turkish, 48-49% 22.50

Turkish, 45-46% 19.00

Turkish, 40-44% 17.00

Chrome concentrates (Turkish) c.i.f. Atlantic Seaboard, per gross ton: 50%\$25.00

48-49% 23.50

FLUORSPAR

Per Net Ton

Domestic washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail\$17.00 to \$18.00

Domestic, f.o.b. Ohio River landing barges 18.00

No. 2 lump, 85-5, f.o.b. Kentucky and Ill. mines 18.00

Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid.... 21.50

Domestic No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines.... 31.50

FUEL OIL

Per Gal.

No. 2, f.o.b. Bayonne 3.75c.

No. 6, f.o.b. Bayonne 2.26c.

No. 5 Bur. Stds., del'd Chicago 3.25c.

No. 6 Bur. Stds., del'd Chicago 2.75c.

No. 3 distillate, del'd Cleve'd. 5.50c.

No. 4 industrial, del'd Cleve'd. 5.25c.

No. 5 industrial, del'd Cleve'd. 3.00c.

No. 6 industrial, del'd Cleve'd. 2.75c.

COKE

Per Net Ton

Furnace, f.o.b. Connells-ville, Prompt \$3.75

Furnace, f.o.b. Connells-ville, Prompt\$4.75 to 5.50

Foundry, by - product, Chicago ovens 10.25

Foundry, by - product, del'd New England.... 12.50

Foundry, by - product, del'd Newark or Jersey City10.88 to 11.40

Foundry, by - product, Philadelphia 10.95

Foundry, by - product, delivered Cleveland ... 10.30

Foundry, by - product, delivered Cincinnati... 9.75

Foundry, Birmingham... 7.50

Foundry, by - product, del'd St. Louis industrial district10.75 to 11.00

Foundry, from Birmingham, f.o.b. cars dock Pacific ports 14.75

IRON AND STEEL WAREHOUSE PRICES

PITTSBURGH*

	Base per Lb.
***Plates	3.55c.
***Shapes	3.55c.
***Soft steel bars and small shapes	3.60c.
***Reinforcing steel bars	2.70c.
stock	3.70c.
Cold finished bars and screw stock	3.70c.
***Hot rolled strip	3.75c.
***Hot rolled sheets	3.50c.
Galv. sheets (24 ga.) 500 lb. to 1499 lb.	4.50c.
Wire, black, soft annealed	3.15c.
Wire, galv., soft	3.55c.
Track spikes (1 to 24 kegs)	3.60c.
Wire nails (in 100-lb kegs)	2.65c.

On plates, structurals, bars, strip and hot rolled sheets, base applied to orders of 400 to 1999 lb.
 ** On reinforcing bars base applies to orders of less than one ton and includes switching and carting charge.

* All above prices for delivery within the Pittsburgh switching district

*** For the time being, these prices are purely nominal as concessions ranging from \$2 to \$5 a ton on these products have been made recently on local sales.

NEW YORK

	Base per Lb.
Plates, 1/4 in. and heavier	3.76c.
Structural shapes	3.75c.
Soft steel bars, round	3.94c.
Iron bars, Swed. charcoal	7.50 to 8.25c.
Cold-fin, shafting and screw stock:	
Rounds, squares, hexagons	4.14c.
Flats up to 12 in. wide	4.14c.
Cold-rolled strip, soft and quarter hard	3.66c.
Hot-rolled strip, soft O.H.	4.11c.
*Hot-rolled sheets (8-30 ga.)	3.40c.
Galv. sheets (24 ga.)	4.50c.
Long ternes (24 ga.)	5.50 to 6.20c.
Cold-rolled sheets (20 ga.)	
Standard quality	4.60c.
Deep drawing	4.85c.
Stretcher leveled	5.10c.
SAE, 2300, hot-rolled	7.50c.
SAE, 3100, hot-rolled	6.10c.
SAE, 6100, hot-rolled annealed	10.25c.
SAE, 2300, cold-rolled	8.69c.
SAE, 3100, cold-rolled, annealed	7.29c.
Floor plate, 1/4 in. and heavier	5.43c.
Standard tool steel	12.50c.
Wire, black, annealed (No. 9)	4.65c.
Wire, galv. (No. 9)	5.00c.
Open-hearth spring steel	4.75c. to 10.25c.
Common wire nails, per keg in 25 keg lots	\$2.90

*For lots less than 2000 lb.

CHICAGO

	Base per Lb.
Plates and structural shapes	3.55c.
Soft steel bars, rounds and angles	3.60c.
Soft steel squares, hexagons, channels and Tees	3.75c.
Hot rolled strip	3.75c.
Floor plates	5.15c.
Hot rolled sheets	3.50c.
Galvanized sheets	4.50c.
Cold rolled sheets	4.45c.
Cold finished carbon bars	3.80c.

Above prices are subject to deductions and extras for quantity and are f.o.b. consumer's plant within Chicago free delivery zone.

CLEVELAND

	Base per Lb.
Plates	3.55c.
Structural shapes	3.73c.
Soft steel bars	3.50c.
Reinfor. bars (under 2000 lb.)†	2.55c.
Cold-fin. bars (1000 lb., over)	3.80c.
Hot-rolled strip	3.65c.
Cold rolled sheets	4.70c.
Cold-finished strip	3.35c.
Galvanized sheets (No. 24)	4.62c.
Hot-rolled sheets	3.50c.
Floor plates, 3/16 in. and heavier	5.33c.
*Black ann'l'd wire, per 100 lb.	\$3.10
*No. 9 galv. wire, per 100 lb.	3.50
*Com. wire nails, base per keg	2.60
Hot rolled alloy steel (3100)	6.05c.
Cold rolled alloy steel (3115)	6.85c.

* For 5000 lb. or less.

† 500 lb. base quantity.

Prices shown on hot rolled bars, strip, sheets, shape and plates are for 400 to 1999 lb. Alloy steel, 1000 lb. and over; galvanized sheets, 150 to 1499 lb.; cold rolled sheets, 399 lb. and under.

ST. LOUIS

	Base per Lb.
Plates and structural shapes	3.47c.
Bars, soft steel (rounds and flats)	3.72c.
Bars, soft steel (squares, hexagons, ovals, half ovals and half rounds)	3.37c.
Cold fin. rounds, shafting, screw stock	4.07c.
Galv. sheets (24 ga.)	4.53c.
Hot rolled sheets	3.53c.
Galv. corrugated sheets, 24 ga. and heavier*	4.58c.
Structural rivets	5.02c.

* No. 26 and lighter take special prices.

BOSTON

	Base per Lb.
Structural shapes, 3 in. and larger	5.85c.
Plates, 1/4 in. and heavier	3.85c.
Bars	3.98c.
Heavy hot rolled sheets	3.86c.
Hot rolled sheets	4.21c.
Hot rolled annealed sheets	4.76c.
Galvanized sheets	4.76c.
Cold rolled sheets	4.93c.
The following quantity differentials apply: Less than 100 lb., plus \$1.50 per 100 lb.; 100 to 399 lb. plus 50c.; 400 to 1999 lb. base; 2000 to 9999 lb. minus 20c.; 10,000 to 39,999 lb. minus 30c.; 40,000 lb. and over minus 40c.	

BUFFALO

Plates	3.77c.
Floor plates	5.40c.
Struc. shapes	3.55c.
Soft steel bars	3.60c.
Reinforcing bars (20,000 lb. or more)	2.05c.
Cold-fin. flats, squares, rounds, and hex.	3.80
Hot-rolled sheets, 3/16 x 14 in. to 48 in. wide incl. also sizes No. 8 to 30 ga.	3.50c.
Galv. sheets (24 ga.)	4.50c.
Bands and hoops	3.97c.

NEW ORLEANS

	Base per Lb.
Mild steel bars	4.20c.
Reinforcing bars	3.24c.
Structural shapes	4.10c.
Plates	4.10c.
Hot-rolled sheets, No. 10	4.35c.
Steel bands	4.75c.
Cold-finished steel bars	5.10c.
Structural rivets	4.85c.
Boiler rivets	4.85c.
Common wire nails, base per keg	3.55
Bolts and nuts, per cent off list	60

REFRACTORIES PRICES

	Fire Clay Brick
	Per 1000 f.o.b. Works
Super-duty brick, at St. Louis	\$60.30
First quality Pennsylvania, Maryland, Kentucky, Missouri and Illinois	47.50
First quality, New Jersey	52.50
Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	42.75
Second quality, New Jersey	49.00
No. 1, Ohio	39.90
Ground fire clay, per ton	7.10

	Silica Brick
	Per 1000 f.o.b. Works
Pennsylvania	\$47.50
Chicago District	55.10
Birmingham	47.50
Silica cement per net ton (East-ern)	8.55

	Chrome Brick
	Net per Ton
Standard f.o.b. Baltimore, Plymouth Meeting and Chester	\$47.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	47.00

	Magnesite Brick
	Net per Ton
Standard f.o.b. Baltimore and Chester	\$67.00
Chemically bonded, f.o.b. Baltimore	57.00

	Grain Magnesite
	Net per Ton
Imported, f.o.b. Baltimore and Chester, Pa. (in sacks)	\$45.00
Domestic, f.o.b. Baltimore and Chester in sacks	40.00
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

PHILADELPHIA

	Base per Lb.
*Plates, 1/4-in. and heavier	3.40c.
*Structural shapes	3.40c.
*Soft steel bars, small shapes, iron bars (except bands)	3.60c.
†Reinforc. steel bars, square and deformed	2.61c.
Cold-finished steel bars	4.11c.
*Steel hoops	4.10c.
*Steel bands, No. 12 and 3/16 in. incl.	3.60c.
*Spring steel	4.75c.
†Hot-rolled anneal. sheets	3.40c.
†Galvanized sheets (No. 24)	4.33c.
*Diam. pat. floor plates, 1/4 in.	5.00c.

These prices are for delivery in Philadelphia trucking area.

*For quantities between 400 and 1999 lb.

†For 10 bundles or over.

‡For one to five tons.

BIRMINGHAM

	Base per Lb.
Bars and bar shapes	3.50c.
Structural shapes and plates	3.45c.
Hot rolled sheets No. 10 ga.	3.40c.
Galvanized sheets No. 24 ga.	4.75c.
Strip	3.65c.
Reinforcing bars	3.50c.
Floor plates	5.83c.
Cold finished bars	4.73c.
Machine and carriage bolts	50 & 10 off list
Rivets (structural)	\$4.60 base
On plates, shapes, bars, hot-rolled strip heavy hot-rolled sheets, the base applies on 400 to 3999 lb. All prices are f.o.b. consumer's plant.	

PACIFIC COAST

	San Francisco	Los Angeles	Seattle
Plates, tanks and U. M.	3.60c.	4.00c.	3.40c.
Shapes, standard	3.60c.	4.00c.	3.40c.
Soft steel bars	3.65c.	4.00c.	3.85c.
Reinforcing bars, f.o.b. cars dock			
Pacific ports	2.275c.	open.	2.975c.
Hot-rolled sheets (No. 10)	3.60c.	4.20c.	3.95c.
Galv. sheets (No. 24 and lighter)	5.15c.	4.75c.	4.75c.
Galv. sheets (No. 22 and heavier)	5.40c.	4.75c.	4.75c.
Cold-finished steel			
Rounds	6.55c.	6.60c.	7.10c.
Squares and hexagons	7.30c.	7.35c.	7.10c.
Flats	8.30c.	8.35c.	8.10c.
Common wire nails—base per keg less carload	\$3.20	\$2.85	\$3.00

All items subject to differentials for quantity.

ST. PAUL

	Base per Lb.
Mild steel bars, rounds	4.10c.
Structural shapes	4.00c.
Plates	4.00c.
Cold-finished bars	4.83c.
Hot-rolled annealed sheets, No. 24	4.75c.
Galvanized sheets, No. 24	5.00c.

On mild steel bars, shapes and plates the base applies on 400 to 14,999 lb. On hot-rolled sheets, galvanized sheets and cold-rolled sheets base applies on 15,000 lb. and over. Base on cold-finished bars is 1000 lb. and over of a size.

DETROIT

	Base per Lb.
Soft steel bars	3.43c.
Structural shapes	3.80c.
Plates	3.75c.
Floor plates	5.42c.
Hot-rolled sheets, 8 to 30 gages above 12 in. and 3/16 in., 24 in. to 48 in. wide	3.58c.
Cold-rolled sheets	4.65c.
Galvanized sheets	4.74c.
Hot-rolled strip, under No. 12	3.83c.
Hot-rolled strip, No. 12 and over	3.58c.
Cold-finished bars	3.85c.
Cold-rolled strip	3.55c.
Hot-rolled alloy steel (SAE 3100 Series)	6.17c.

Quantity extras apply to all items.

PLANT EXPANSION AND EQUIPMENT BUYING

◀ NORTH ATLANTIC ▶

Continental Oil Co., 60 East Forty-second Street, New York, has approved plans for new gasoline refinery in Ville Platte, La., oil field district, with compressor station to be equipped with two 400-hp. engine-driven compressor units and accessories; also steel tank storage facilities, pumping station and other structures. Project will include a crude oil desalting plant and pressure maintenance unit. Cost close to \$500,000 with equipment. Company has branch office at Ponca City, Okla.

Superintendent of Lighthouses, St. George, Staten Island, New York, asks bids until April 24 for 10 reduction gear heads, ratio 144-1, with 2-in. shaft extensions (Circular 59387).

Carvin Bottle Cap Corp., 1155 Manhattan Avenue, Brooklyn, has leased about 40,000 sq. ft. of floor space in Yorke Terminal Warehouse, Greenpoint, Brooklyn, for plant. New works will replace a former plant recently destroyed by fire.

Chicago Pneumatic Tool Co., 6 East Forty-fourth Street, New York, is considering new plant for Pacific Coast trade at Burbank, Cal., comprising a main one-story unit with smaller structures. Cost over \$400,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 28 for electric bus transfer equipment, switches, relays, etc. (Schedule 6079) for Brooklyn and Philadelphia Navy yards; until May 5, socket wrenches (Schedule 6077) for Brooklyn and Mare Island Navy yards.

Tubize Chatillon Corp., 2 Park Avenue, New York, cellulose rayon products, has authorized immediate erection of one-story addition, 147 x 175 ft., to mill at Rome, Ga., for which general contract recently was let to Batson-Cook Co., West Point, Ga. Cost close to \$100,000 with equipment. Robert & Co., Bona Allen Building, Atlanta, Ga., are architects and engineers.

Reinhardt Engineering Co., 300 Douglass Street, Brooklyn, electrical equipment and contracting, has purchased two-story building at 841 Thirty-ninth Street for plant.

Signal Corps Procurement District, Army Base, Fifty-eighth Street and First Avenue, Brooklyn, asks bids until April 26 for plugs (Circular 221), 3800 ft. of cable and three reels (Circular 222); until April 28, 2000 axles (Circular 210).

Commanding Officer, Ordnance Department, Watervliet Arsenal, Watervliet, N. Y., asks bids until April 25 for bronze bearing castings (Circular 195).

Seaberg Elevator Co., 407 Douglass Street, Brooklyn, passenger and freight elevators, parts, etc., has purchased two-story building at 243-53 Forty-fourth Street, on site 100 x 100 ft., for plant, expanding present capacity.

Commanding Officer, Ordnance Department, Picatinny Arsenal, near Dover, N. J., asks bids until April 25 for high and low pressure hydraulic valves with screw stem operating mechanism (Circular 685), 4500 fuse hole plugs (Circular 705), seamless brass tubing (Circular 707).

Bureau of Yards and Docks, Navy Department, Washington, asks bids until April 26 for one 10-ton electric-operated traveling crane, hammerhead type, for Philadelphia Navy Yard (Specifications 8999).

SKF Industries, Inc., Front Street and Erie Avenue, Philadelphia, has let general contract to Cahill Brothers, 206 Sansome Street, San Francisco, for one-story factory branch, storage and distributing plant on Bryant Street, San

Francisco. Cost close to \$40,000 with equipment. W. D. Peugh, 333 Montgomery Street, San Francisco, is architect.

Pennsylvania Turnpike Commission, 11 North Fourth Street, Harrisburg, Pa., asks bids until May 1 for fans, motors and transmission equipment for ventilation systems of eight tunnels of Pennsylvania turnpike. John D. Faller is secretary and treasurer.

Commanding Officer, Ordnance Department, Frankford Arsenal, Philadelphia, asks bids until April 25 for one motor-driven, geared-head engine lathe (Circular 974), rework 10,000 lb. gilding metal trimmings into gilding metal (Circular 989), rework 150,000 lb. of cartridge brass trimmings into cartridge brass cups (Circular 990), rework 150,000 lb. of cartridge brass trimmings, 40,000 lb. of cartridge brass scrap, 11,000 lb. of anvil brass clippings, 10,000 lb. of scrap brass, 10,000 lb. of primer cup brass, and 179,000 lb. of cartridge brass scrap into 400,000 lb. of cartridge brass cups (Circular 991).

◀ BUFFALO DISTRICT ▶

General Mills, Inc., Chamber of Commerce Building, Minneapolis, Minn., manufacturer of cereals, plans new branch plant at Buffalo, consisting of a large multi-story building, with smaller units. A flour storage and distributing division will be installed. Cost about \$1,800,000 with equipment.

Spencer Kellogg & Sons, Niagara Square, Buffalo, manufacturer of linseed and other oils, plans one-story soy bean processing mill at Decatur, Ill. Cost about \$75,000 with equipment.

Great Lakes Coal & Coke Co., 910 South Michigan Avenue, Chicago, has asked bids on general contract for new one-story carbon plant at Niagara Falls, N. Y. Cost close to \$65,000 with equipment.

◀ NEW ENGLAND ▶

Commanding Officer, Ordnance Department, Springfield Armory, Springfield, Mass., asks bids until April 24 for eight sets of high-speed steel cutters (Circular 397), one motor-driven center lapping machine (Circular 392); until April 25, counterbores, end mills, reamers, cutters, etc. (Circular 396); until April 27, three small automatic motor-driven milling machines (Circular 393).

United Aircraft Corp., East Hartford, Conn., has let general contract to Edwin Moss & Son, Inc., 555 Grant Street, Bridgeport, Conn., for one-story addition, 150 x 450 ft., to its Sikorsky Aviation Division, Stratford, Conn., to be occupied by Chance Vought Aircraft Division, which will be removed from East Hartford as soon as new structure is ready. Cost over \$200,000 with equipment. Albert Kahn, Inc., New Center Building, Detroit, is architect and engineer.

Bureau of Yards and Docks, Navy Department, Washington, asks bids until April 26 for pumping machinery, deaerating feedwater heaters and accessories for power house at naval torpedo station, Newport, R. I. (Specifications 9108).

Liebmann Breweries, Inc., 36 Forrest Street, Brooklyn, has let general contract to Hewlett Co., 1385 Transtane Avenue, Bridgeport, Conn., for one-story and basement branch plant, 85 x 120 ft., at Fairfield, Conn., for storage and distribution. Cost over \$50,000 with equipment.

◀ WASHINGTON DIST. ▶

Contracting Officer, Office of Chief of Engineers, Munitions Building, Washington, asks bids until April 27 for one 35-ton locomotive, diesel or gasoline-electric, for Raritan Arsenal, Raritan, N. J. (Circular 45).

General Purchasing Officer, Panama Canal, Washington, asks bids until April 24 for

125,000 ft. of solid copper rubber-insulated wire, stainless steel armature banding wire, phosphor-bronze wire, cast iron valve boxes, brass cup hooks, brass screw eyes, steel cap screws, cotter pins, machine screw nuts, etc. (Schedule 3441); until April 25, one motor-driven pumping unit for pumping salt water to ships in Balboa drydock, with motor and starter (Schedule 3447); until April 28, one 27 cu. ft. concrete mixer, gasoline engine-driven, with automatic distributing boom and bucket, and separate gravity discharge chute, each operated independent of other, also an elevating power charging skip, automatic water-measuring system, and set of tools (Schedule 3446).

Maryland State National Guard, Air Corps, Dundalk, Md., plans new steel hangars, with repair and reconditioning shops, and administration building at airport. Appropriation of \$250,000 is being arranged.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 25 for one motor-driven portable air compressor (Schedule 6096); until April 28, one distilling unit, tools, wrenches and spare parts (Schedule 6083) for Philadelphia Navy Yard; until April 25, gate valves and spare seat rings (Schedule 6021), motor-driven centrifugal pumps, with spare parts, tools and wrenches (Schedule 6030) for Eastern yards and Puget Sound yard; until April 28, steel roller paths and rollers (Schedule 6078) for Washington yard; motor-driven wildcat-type windlass capstans, with spare parts (Schedule 6048), outfit for protective treatment of aluminum and aluminum alloy (Schedule 6032) for Eastern and Western yards.

◀ SOUTH ATLANTIC ▶

Southern Tissue Mills, Inc., Rockingham, N. C., recently organized, has plans for establishment of local mill for production of tissue and other paper stocks. Arrangements have been made to purchase certain equipment from plant of Mumford Paper Mills, Inc., Mumford, N. Y., to be removed to Rockingham, and other machinery will be acquired soon. Cost reported over \$80,000 with equipment.

Century Wood Preserving Co., Charleston, S. C., plans rebuilding part of wood-treating plant on outskirts of city, recently destroyed by fire. Loss over \$100,000 with tanks, pumping machinery, mechanical-handling and other equipment.

◀ SOUTHWEST ▶

Beech Aircraft Co., Wichita, Kan., has plans for one-story addition for expansion in assembling division. Cost over \$60,000 with equipment. It is understood that general contract will be let to Austin Co., Cleveland.

United States Engineer Office, Court and Custom House, St. Louis, asks bids until May 5 for power, control and lighting system for lock and dam No. 24, Mississippi River, including hand-operated traveling bridge crane, electric tow-haulage units, gasoline-electric standby power unit, lock power and control system, dam power distribution system, lighting and signal units, fuel oil system and other installation.

Ralston Purina Co., 835 South Eighth Street, St. Louis, has approved plans for addition to branch mill at Lafayette, Ind., including grain storage and distributing bins, two steel storage tanks and other structures. Cost over \$75,000 with equipment.

Wall-Rogalsky Milling Co., McPherson, Kan., has let general contract to Ryan Construction Co., Keeline Building, Omaha, Neb., for addition to flour and feed mill, including storage bin units of 100,000 bu. capacity. Cost over \$70,000 with equipment. Horner & Wyatt, Board of Trade Building, Kansas City, Mo., are consulting engineers.

Bethlehem-International Supply Co., 7100 Clinton Drive, Houston, Tex., oil well equipment and supplies, steel pipe, etc., has let general contract to Southwestern Construction Co., 3802 Calhoun Street, for one-story addition, 264 x 320 ft., for storage and distribution. Installation will include four overhead electric traveling cranes, electric hoists, con-

veyors and other equipment. Company will also build addition to office, with two wing extensions. Cost over \$225,000 with equipment. W. L. Kane is resident engineer, in charge.

Quartermaster, William Beaumont General Hospital, El Paso, Tex., asks bids until May 4 for one metal-turning lathe, motor-driven planer, power drill, motor-driven pipe machine, universal woodworking machine and portable electric hammer (Circular 142-4).

◀ WESTERN PA. DIST. ▶

Hygrade Sylvania Corp., Emporium, Pa., manufacturer of radio tubes, electric lamps, etc., plans one-story addition, about 50,000 sq. ft. of floor space. Cost over \$100,000 with equipment. Work on superstructure will begin soon. Main offices are at Salem, Mass.

United States Engineer Office, Huntington, W. Va., asks bids until May 4 for 24 electric-operated pumping units and accessory equipment for use in flood wall, capacity range from 1500 gal. per min. and higher.

Aluminum Co. of America, Gulf Building, Pittsburgh, will ask bids soon on general contract on one-story addition to its Canadian branch plant at Chicoutimi, Que., operated in name of Aluminum Co. of Canada, Ltd., 1010 St. Catherine Street, Montreal. Cost close to \$200,000 with equipment.

◀ SOUTH CENTRAL ▶

Merit Water Heater Co., Compton, Cal., automatic gas and electric water heaters, tanks, etc., has acquired plant of Bessemer Foundry & Machine Co., Bessemer, Ala., and will remodel for branch plant to be operated under name of United States Heater Co., a subsidiary. Plans are under way for one-story additions. Cost over \$50,000 with equipment.

United States Engineer Office, Vicksburg, Miss., asks bids until May 1 for four boilers and accessory equipment, marine type (Circular 206).

Tennessee Valley Authority, Knoxville, Tenn., will secure appropriation early in July for Watts Bar power dam and hydroelectric generating station on Tennessee River, near Spring City, Rhea County, Tenn., to include power dam about 2930 ft. long, generating station with hydraulic turbines, governors and electric generators for initial capacity of 90,000 kw., divided into three 30,000-kw. units, and later to be increased to 150,000-kw. rating; also navigation lock, spillway, transmission lines and other structures. Entire project will cost about \$35,000,000 and is scheduled for completion late in 1942.

◀ OHIO AND INDIANA ▶

Century Machine Co., 4434 Marburg Avenue, Cincinnati, bakers' machinery and parts, has let general contract to J. & F. Harig Co., 1425 Queen City Avenue, for one-story addition, 100 x 140 ft. Cost close to \$75,000 with equipment. Tietig & Lee, 34 West Sixth Street, are architects.

Ohio Edison Co., Youngstown, Ohio, a unit of Commonwealth & Southern Corp., New York, has plans for addition to hydroelectric generating station at Toronto, Ohio, including equipment. Cost over \$2,500,000 with transmission lines and other extensions. This is part of a \$4,000,000 expansion and improvement program to be carried out by company this year.

Goodyear Tire & Rubber Co., Akron, Ohio, has leased part of building of National Bellas Hess Co., Kansas City, Mo., for new factory branch, storage and distributing plant. Kansas City offices are at 2558 McGee Trafficway.

Contracting Officer, Materiel Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until April 25 for pressure gage assemblies and dead-weight pressure gage testers (Circular 896); until April 26, 1354 tool kits (Circular 909); until April 27, 25 surface plates and four lapping plates (Circular 913).

Master Tire & Rubber Co., Cuyahoga Falls, Ohio, has approved plans for one-story addition to branch mill at Findlay, Ohio, 60 x 100

ft., for storage and distribution. Cost close to \$40,000 with equipment.

Indiana Oil & Refining Co., Mount Vernon, Ind., recently organized, has begun construction of a new oil refinery on local site. Company has purchased plant of Trinity Refining Co., Gladewater, Tex., and will remove machinery to new Mount Vernon refinery, where additional equipment will be provided, including cracking machinery for gasoline production, steel storage tanks and other facilities. Lon Huddleston, Gladewater, is president of new company.

Blish Milling Co., Seymour, Ind., has asked bids on general contract for addition to flour and feed mill, including nine storage bins, each about 100,000 bu. capacity. Cost over \$80,000 with equipment. O. A. Tislow, Architects' & Builders' Building, Indianapolis, is architect and engineer.

◀ MICHIGAN DISTRICT ▶

Martin Electric Co., 705 Piquette Avenue, Detroit, manufacturer of electric welding machines and parts, and other electrical equipment, has let general contract to Fullerton Construction Co., 11733 Russell Street, for new plant on East Outer Drive, consisting of a main one-story unit, 96 x 100 ft., and office structure, 37 x 96 ft. A 10-ton crane will be installed in conjunction with other handling equipment. Cost over \$65,000 with equipment. Augustus O'Dell, Marquette Building, is architect.

Mount Clemens Metal Products Co., Mount Clemens, Mich., small metal specialties for automobiles, is considering one-story addition to occupy part of three and one-half acre tract adjoining plant, recently acquired. Cost over \$40,000 with equipment.

Gelatin Products Co., 620 East Hancock Street, Detroit, food products, will take bids soon on general contract for two-story addition. Cost about \$50,000 with equipment. Smith, Hinchman & Grylls, Inc., Marquette Building, is architect and engineer.

◀ MIDDLE WEST ▶

Commanding Officer, Ordnance Department, Rock Island Arsenal, Rock Island, Ill., asks bids until April 24 for drop forgings (Circular 670).

Western-Austin Co., Farnsworth Avenue, Aurora, Ill., road machinery and other mechanical equipment, has plans for two additions and remodeling and improving existing factory. Erection will consist of one-story unit, 150 x 251 ft., all-welded rigid steel frame construction, for raw material storage and distribution; and adjoining one-story structure, 120 x 520 ft., similar type construction, for an assembling unit, installation to include two 5-ton and three 3-ton electric cranes, hoists and other mechanical-handling facilities. Cost of two units is estimated at \$275,000 with equipment. Remodeling of existing building, used for forge shop and other service, will cost about \$175,000 with equipment. E. O. Sessions & Co., 120 South La Salle Street, Chicago, are consulting engineers.

City Council, Worthington, Minn., G. S. Thompson, city clerk, asks bids until April 26 for extensions and improvements in municipal electric power plant, including new turbo-generator unit and accessories, condenser, switchgear and auxiliary equipment. Ralph D. Thomas & Associates, 1200 Second Avenue South, Minneapolis, Minn., are consulting engineers.

Quartermaster, Chanute Field, Rantoul, Ill., asks bids until April 26 for steel cabinets, steel conduit, electric meters, copper wire, cutout bases, outlet boxes, safety switches and other equipment (Circular 196-34).

L. R. McKee, 1108 Mulberry Street, Muscatine, Iowa, has acquired site of former municipal waterworks pumping station for one-story mill for soy bean processing. Existing structure will be razed at once. Cost close to \$40,000 with equipment.

International Harvester Co., Chicago, has announced transfer of cream separator divi-

sion from Milwaukee plant to branch at Richmond, Ind., to facilitate expansion of diesel engine and tractor division at Milwaukee and addition of larger diesel units to its line of products. E. J. Leiser is general superintendent at Milwaukee.

Neenah Foundry Co., Neenah, Wis., has placed contracts for three additions to casting shop, one 50-ft. sq., another 37 x 50 ft., and a third 12 x 65 ft. With equipment new units will cost about \$30,000.

◀ PACIFIC COAST ▶

Swift & Co., Union Stock Yards, Chicago, have asked bids on general contract for new one-story meat processing and packing plant at Fourth Street South and Connecticut Street, Seattle, 150 x 320 ft. Cost over \$200,000 with equipment.

Board of Directors, Turlock Union High School District, Turlock, Cal., will take bids soon on general contract for one-story vocational shop at high school. Cost about \$40,000 with equipment. H. L. Gogerty, 6272 Yuca Street, Hollywood, Cal., is architect.

Bureau of Yards and Docks, Navy Department, Washington, asks bids until May 10 for three-story shop, 60 x 280 ft., boiler house and transformer station at Mare Island Navy Yard, with steel stack for boiler plant (Specifications 8994).

Board of Directors, Imperial Irrigation District, El Centro, Cal., asks bids until May 2 for hydraulic gates, gate hoists and transfer cars for new hydroelectric power plant at Drop No. 4, All-American Canal, near Calexico, Cal., including three 12-ft. 8-in. by 18-ft. 3-in. radial gates; three 16,000-lb. double-drum, motor-driven radial gate hoists; three 11 x 12-ft. 6-in. bulkhead gates; one bulkhead gate crane, with hand hoist and gate-connecting chains, and one bulkhead gate crane track. M. F. Dowd is chief engineer and general manager.

Coca-Cola Bottling Co., 205 Roy Street, Seattle, plans early call for bids on one-story mechanical bottling plant on block bounded by Thirteenth and Fourteenth Streets, Cherry and Columbia Streets. Cost close to \$140,000 with equipment. Graham & Painter, Dexter-Horton Building, are architects. Main offices of company are at Atlanta, Ga.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 25 for one motor-driven squaring shear; until April 28, one windlass and capstan, with set of electrical and mechanical spare parts (Schedule 6053); until May 2, eight electric arc welding sets and eight sets of accessories (Schedule 6058), four motor-driven precision bench lathes and equipment (Schedule 6073), two motor-driven, 16-in. universal crank shapers, equipment and spare parts (Schedule 6074) for Mare Island Navy Yard; until April 28, 5000 ft. of galvanized rigid steel conduit (Schedule 6043), 71,125 ft. of one-conductor cable (Schedule 6044) for Puget Sound Navy Yard; until May 5, magnetic inspection equipment, horizontal stationary type (Schedule 6049) for East San Pedro, Cal., naval air station.

◀ FOREIGN ▶

Wiltshire File Co., Pty., Ltd., Sydney, New South Wales, Australia, files, rasps, saw files, etc., has approved plans for new one-story plant in Sunshine district, with facilities for more than 200 persons. Cost close to \$100,000 with equipment.

Ontario Paper Co., Ltd., Thorold, Ont., plans one-story addition. Cost about \$160,000 with equipment. L. C. Anderson is manager and engineer.

C. A. Parsons & Co., Ltd., Heaton Works, Newcastle-on-Tyne, England, manufacturer of electric power plant equipment, air compressors, etc., plans one-story addition, primarily for welding works. Cost close to \$125,000 with machinery.

Canadian Associated Aircraft, Ltd., Toronto, has acquired about 15 acres near Malton airport of city for new plant for parts production and assembling. Cost close to \$400,000 with equipment.

THIS WEEK'S MACHINE ...TOOL ACTIVITIES...

... Mixed sales trend seen in the face of the European crisis, following highest index of sales in March in over a year ... Uncertainties holding up some programs.

Increase in Domestic Volume Makes Up Foreign Decline

CINCINNATI — While the machinery demand in this area is without volume change, manufacturers report an increasing domestic business. Some of this is accounted for by the stimulus from Government orders, but a fair amount of industrial business is noted. Chief to feel the change are millers and grinders, lathes having responded to domestic demand early in the first quarter. Of course, sizable foreign business is still being recorded, but this is not in the overwhelming proportion that has obtained for the past year. Heavy tools are still reported to be more active on export than domestic business, but prospects to change the disparity are good.

Factory operations still have room for expansion, current rate being about 65 per cent of capacity. Shipments are being speeded, but in some instances producers are behind instructions.

April Sales Running Behind Those of March

CLEVELAND—Buyer hesitancy, which has become more pronounced than a few months ago, is holding back temporarily at least some of the large expansion programs which were in the making. Most dealers report April sales are running behind the comparable period of March. Orders for small and medium-sized single pieces of equipment are fairly well maintained, however, and diversified.

The Chevrolet project at Toledo has undergone several changes. Activity around Pontiac, Mich., has been good. A number of school jobs offer moderate activity. Press manufacturers, after a good run of business in February and early March, report conditions more spotty during the past two weeks. With some of the largest programs held up, very little quantity business is being received.

Sales in Mid-West Same Level as in March

CHICAGO—Sales thus far in April are about equal to those of the same period last month. Small tool orders are also being received at about the same rate as a month ago. The program of the International Harvester Co. has slowed noticeably, though no cancellations of previous plans have been announced. Some machines are pending at the Milwaukee works for the tractor engine production. Lists of the Milwaukee and Santa Fe roads have not yet been closed.

Government Plants Buying Many Kinds of Small Tools

BOSTON—Government plants in New England are buying large quantities of small tools as well as machine tools and other equipment. To illustrate, commanding officer armory, Springfield, Mass., closed bids April 18 on 2000 adjustable wrenches, 200 adjustable screw wrenches, 2000 strap pipe wrenches, 100 wrench straps, 20 in. long for pipe wrenches, 2000 drive pin punches, 2100 common screw drivers, 600 lead hammers, 400 pairs soldering coppers, and 39,000 twist drills.

Some Hesitation Seen in Buying in the East

NEW YORK—Uncertainties caused by the European crisis and bearish sentiment radiating from the stock market has tended to slow up commitments for productive machinery on the part of general industry. Buying in the recent past has included refinery equipment makers, locomotive builders and heavy electrical and steam equipment manufacturers. Hence, the past week saw a decline in orders received by some sellers. Those that did report orders at the same high level as established in the last month or two indicated that new business was coming almost entirely from aircraft engine and parts producers.

Detroit Machine Tool Firms Report Jump in Orders

DETROIT—With many machine tool manufacturers in this area at peak activity as a result of domestic and foreign orders, there has been a moderate increase in tool and die shop business in the last week.

One of the large machine tool shops and a plant which specializes in what might be termed accessory units are reported extremely active on both industrial and military orders. An example of the pick-up experienced here is one of the smaller shops manufacturing a type of equipment used in finishing automotive parts, aircraft parts and for certain work in arsenals. This firm built up its backlog of orders so rapidly during three days of last week that it reported itself "pretty busy" on Tuesday and "virtually unable to handle any new business" on Friday.

Tool and die shops, which have been in a bad way, experienced some pickup in the last week, enough to indicate an accelerating demand. However, automotive work is still very slow in coming out, and shops which concentrate largely

on automotive die work are not faring as well as they usually do at this time of year. The call is out now, however, for die designers and tool engineers, indicating an early improvement for the shops.

One of the principal active buying programs involves Plymouth, which is making extensive changes in its Los Angeles plant and buying some \$250,000 worth of equipment in Detroit now. Among orders already placed is one with Surface Combustion Co., Toledo, for a paint drying oven to be erected shortly at Los Angeles.

Government Taking Bids On Cranes for Army-Navy

Chief Bureau of Yards and Docks, Navy Department, Washington, on Specification 9144, is taking bids on four 20-ton, and two five-ton electric bridge cranes for the Portsmouth, N. H., Navy Yard. No date has been set for bids to close.

United States Marine Commission has approved the purchase of two gantry electric magnet cranes for the Boston Army Base to cost approximately \$90,000. Bids will be asked shortly. It is planned to have the cranes operating some time this summer.

Machine Tool Orders Up for Sixth Month

THE index of orders of the National Machine Tool Builders' Association continued during March the uptrend that began six months ago. The March figure of 185.4 is a gain of 18.3 points from the February figure of 167.1, and is well ahead of the 107.0 reported for March, 1938. Domestic orders showed another increase during March, and foreign orders were about equal to the February volume.

"The first quarter of 1939 shows a much better degree of participation in the business placed by all companies reporting than the last quarter of 1938," said Frida F. Selbert, secretary of the Association. "The improvement in domestic business brings with it a better distribution of new orders throughout the industry."

The three-months moving average is 167.8, compared with 154.8 at the last report, and 100.4 at the end of March, 1938.

The Quinn R. Barton, Inc., of 1305 West Forsyth Street, Jacksonville, Fla., the Great Lakes Supply Corp., 324 W. 36th Street, Chicago, and the Fuchs Machinery & Supply Co., 1102 Farnam Street, Omaha, Neb., have been appointed distributors for Bucyrus-Erie Co., South Milwaukee, Wis., in their territories. They will handle Bucyrus-Erie shovels, draglines and buckets, clamshells, lifting cranes and dragshovels ranging from $\frac{3}{8}$ -yard to $2\frac{1}{4}$ -yard size.

Steel Buyers Oppose FTC Plan

(CONTINUED FROM PAGE 47)

have found that our customers generally accept and believe in it. The present system of freight charges tends to steady the market and in our line of business this is a very important factor.

A New Jersey Steel Jobber

The change proposed by the Federal Trade Commission would make many hundreds of basing points instead of a few as every destination would be a basing point.

A West Virginia Manufacturer of Tools

Let us all endeavor to keep the steel industry and all other industries as far from Government control as possible. Look at the railroads and weep! Our country has grown and become great, our steel industry has prospered under a system of free enterprise and competition. Why change?

A Maine Steel Jobber

We believe the old Pittsburgh basis was for the best interests of all, including both dealers and consumers.

Purchasing Agent of a Rochester, N. Y., Manufacturer

I do not agree with the Federal Trade Commission.

A St. Louis Sheet Metal Fabricator

Most important is to have the Government stop agitating and let business alone for awhile.

A Missouri Sheet Metal Manufacturer

Why is it that the type of man on these committees know nothing of the steel business or any other business—merely theorists, lawyers or college professors, and do not know our problems. Are we to continually place these political expediency examinations at the expense of business and the cost to the taxpayers with no results in stimulating prices instead of political control goals.

A West Virginia Manufacturer

The more I hear of the continual agitation of the Federal Trade Commission for abandonment of the basing point figures in the steel business the more I am convinced the whole issue is a political skeleton in the closet to be brought out at convenient

intervals and waved before the steel industry. If the basing point system were to be totally abandoned, the very nature of the rolling mill business would automatically keep the system in effect. I am inclined to believe that the Federal Trade Commission knows this fact.

A Texas Steel Jobber

Any business man that needs the help of the Federal Trade Commission in the conduct of his business will be out of business anyhow, so he does not need much sympathy. It is my opinion that negotiations between producers and buyers should be unrestricted by any Government agency. I recognize that it is necessary to have certain legislation to protect the weak from the strong, but I do not believe in regimentation of all industry by Government bodies who are only politically minded and absolutely without experience or practical knowledge.

A Texas Machinery Manufacturer

Proposal (of Federal Trade Commission) is ridiculous; as insane and impractical as most Federal regulations for the past several years.

A Michigan Manufacturer

The old Pittsburgh basing point was best for everyone. We have lost business ever since the change was made.

A Philadelphia Steel Jobber

They (the Federal Trade Commission) are all wet. It would cause ruinous competition in selling our products.

An Omaha, Neb., Company

We believe the best thing to do would be to make every mill a basing point on every product they make (not limited to the few basing points they now have) and then equalizing the freight rates. We do not object to the basing point system with freight equalization, what we object to is that we must buy sheets from a mill in Kansas City on a Chicago-Gary base, and the mill adds the difference in freight. Make every mill a basing point on every product they make, then go ahead and allow the mills farther away to equalize the freight.

President of a Structural Fabricating Company

I think the Federal Trade Commission can cure a lot of the present trouble so far as the structural steel business is concerned if it would make it impossible for the mills to compete with their own customers. I have reference to the fabricating units of the two larger mills. It is just as reasonable that these mills make automobiles, tin cans, etc., as it is for them to compete with independent fabricators on barges, bridges and buildings. Structural steel is a very small percentage of their total tonnage, still they permit that particular part of their business to upset the general market. There could be less objection if the mills' fabricating units used all the elements of cost in their fabricated structural prices, but this they do not do which I attribute to the animosity between these two companies.

A Wisconsin Structural Steel Fabricator

The small consumer of steel is in a very much improved condition if he is able to buy steel from a number of different sources without freight disadvantages.

And that is true even though milling-in-transit in some instances would practically offset freight rate equalization.

The small consumer of structural steel, whenever his plant is located at some distance from the mills and in territory somewhat restricted as to milling-in-transit, will find his potential market tremendously curtailed, perhaps even to the extent of making it unreasonable for him to continue his business in that particular locality.

Plants, large and small, located in favorable milling-in-transit territory or mill towns, will have absolutely no restrictions or handicaps over anybody in the entire country, whereas the country in a great many instances will have handicaps.

To a very large extent equalization of freight rates on steel shipments will segregate territories east and west, and north and south, depending upon plant location and mill ranges, but unfortunately in this upheaval as to territory there will also be many a casualty, 98 per cent of them small steel fabricators and consumers.

A New York State Structural Steel Fabricator

The largest tonnage we buy consists of wide flanged beams. Source

of supply, two places: Bethlehem at Buffalo, Carnegie at Pittsburgh. We object to having only one source. We must have both sources and the prices must be alike f.o.b. Rochester.

If there is no way to accomplish that, the result in the steel industry will be disastrous to labor and owners and customers.

I have read every word you have printed on the subject. The statement of the commission "To fulfill this purpose, however, there must be no obligation to maintain any announced price for any time whatsoever," sounds absolutely silly to an experienced steel buyer or seller. In fact, a mill by taking technical advantage of this can meet any competition anywhere. It really permits a mill to quote a new price to every different inquiry and can quote a thousand different prices every day, allowing the destination point of shipment to govern the price so as to meet competition.

I am not satisfied, however, with present system. In connection with "fabrication-in-transit" system the Buffalo fabricator can deliver steel in Rochester and in our market just east of Rochester at a cost of \$1.50 plus or minus per ton less than ours. This for the plain steel including freight. To do this the Buffalo fabricator must buy in Pittsburgh. It is an odd situation. We are asking for the restoration of the system used prior to last June. The mills then quoted f.o.b. final destination of job. We were then on equal basis. Of course the system was abused. The mills themselves used it to chisel.

... GREAT BRITAIN.

... Tighter steel position developing despite hesitancy caused by political situation

LONDON, April 18 (By Cable)—United Kingdom steel output in March of over 1,000,000 tons dispelled the hesitancy caused by the political situation. Commercial consumers now believe that delays in covering requirements is dangerous on orders coming in. The relighting of additional steel furnaces is hampered by the tightness in scrap and additional blast furnaces have been started.

There is heavy pressure for deliveries on Government steel contracts, especially in connection with air raid precautions. The government is expected shortly to place a further order

for 1,000,000 small shelters. A sharp revival in shipbuilding in some yards is now assured a full year's operations and good specifications on ship steel have already been placed.

Turkey is buying British locomotives valued at £1,000,000.

Continental steel is still quiet and the general feeling of anxiety over the political situation still persists.

There is good business in Welsh tin plates, with further substantial inquiry for domestic trade and export. Some makers are asking for a shilling over the schedule price for forward export owing to the uncertain steel position. Few bar makers are willing to sell for delivery after the end of June at the official price of £7 5s.

REINFORCING STEEL

... Awards of 8675 tons; 20,400 tons in new projects.

ATLANTIC STATES

AWARDS

- 463 Tons, Somerset County, Pa., Pennsylvania Turnpike, sections 8C and 9A, to Jones & Laughlin Steel Corp., Pittsburgh, through County Construction Co., Carnegie, Pa., contractors.
- 400 Tons, Gloucester, Mass., bars and joists, high school, to Truscon Steel Co., Youngstown.
- 350 Tons, Troy Hills, N. J., highway project, route 6, section 11A, to Joseph T. Ryerson & Son, Inc., Jersey City, N. J.
- 285 Tons, Wappingers Falls, N. Y., school, to Ceco Steel Products Corp., Jersey City, N. J., through John H. Eisle Co., New York.
- 250 Tons, Boston, S. S. Pierce Co. warehouse, to Concrete Steel Co., Boston.
- 200 Tons, Hamburg, N. Y., grade school, to Bethlehem Steel Co., Bethlehem, Pa., through Border Building Co., contractor.
- 150 Tons, Orange, Conn., mesh, State bridge, to an unnamed company, through D. B. Frione & Co., Inc., New Haven, Conn., contractor.
- 150 Tons, Trumbull, Conn., State bridge, to Concrete Steel Co., Boston, through Mariani Construction Co., New Haven, Conn., contractor.
- 150 Tons, Newark, N. Y., school, to Joseph T. Ryerson & Son, Inc., Buffalo.
- 125 Tons, Cortland, N. Y., school, to Truscon Steel Co., Buffalo.
- 106 Tons, Lincoln, N. H., two bridges and road, to Bethlehem Steel Co., Bethlehem, Pa., through Bancroft-Martin.
- 105 Tons, Queens County, N. Y., Cross Island Parkway, contract SC-39-4, to Bethlehem Steel Co., Bethlehem, Pa., through Border Building Co., contractor.
- 100 Tons, Rome, N. Y., Memorial Hospital, to Republic Steel Corp., Cleveland, through Truscon Steel Co., Youngstown.
- 100 Tons, East Hartford, Conn., Chance Vought division, United Aircraft Corp., manufacturing plant, to Concrete Steel Co., Boston.

CENTRAL AND WESTERN STATES

- 2800 Tons, Chicago, fourth section subway, to Concrete Steel Co., Chicago, through John Marsch, Inc., Chicago.
- 950 Tons, San Francisco, junior college science building, to Bethlehem Steel Co., San Francisco, through Clinton Construction Co., San Francisco, contractor.
- 500 Tons, Owensboro, Ky., water and light plant, to Laclede Steel Co., St. Louis, through Engstrom & Wynn, Wheeling, W. Va., contractors.
- 300 Tons, Steubenville, Ohio, sewer project, to Carnegie-Illinois Steel Corp., Pittsburgh, through Galier Bros., Cleveland.

- 241 Tons, Davenport, Iowa, two public schools, to Laclede Steel Co., St. Louis.
- 240 Tons, Cincinnati, Sixth Street viaduct, to West Virginia Rail Co., Huntington, W. Va., through Byrnes-Conway Co., Cincinnati, contractor.
- 220 Tons, Chicago, Laramie Avenue viaduct, to Olney J. Dean Co., Chicago.
- 200 Tons, Rock Island, Ill., Mississippi River bridge, to Inland Steel Co., Chicago, through McCarthy Improvement Co.
- 158 Tons, Alameda, Cal., navy shop superstructure, to West Slope Steel Co., Santa Monica, Cal., through James I. Barnes Construction Co., Santa Monica, contractor.
- 109 Tons, Buena, Wash., Yakima project (Invitation 33845-A), to Bethlehem Steel Co., San Francisco.

PENDING REINFORCING BAR PROJECTS

ATLANTIC STATES

- 9000 Tons, Washington, Social Security building; bids April 25.
- 715 Tons, Yonkers, N. Y., Mulford housing project; Thorn & Katz, New York, architects.
- 650 Tons, Pittsburgh, Bedford housing project; Mellon-Stuart Co., Pittsburgh, low bidder.
- 600 Tons, Green Haven, N. Y., prison.
- 500 Tons, Buffalo, municipal auditorium; bids close May 2.
- 400 Tons, Buffalo, Kleinhans Music Hall; bids close May 9.
- 250 Tons, Brooklyn, shore parkway, contract No. SS-39-2.
- 186 Tons, Queens, N. Y., including 54 tons of piling, Circumferential Highway, project MC-39-11.
- 160 Tons, Portsmouth, Va., Norfolk Navy Yard, requisition 1006-ER.

CENTRAL AND WESTERN STATES

- 3350 Tons, Chicago, Dearborn Street subway river crossing; bids May 4.
- 2000 Tons, Los Angeles, United States Engineer (Proposal 210); bids in.
- 500 Tons, Cleveland, Valleyview housing project.
- 345 Tons, Phoenix, Ariz., South Central Avenue undercrossing; bids May 16.
- 320 Tons, Chicago, addition, Chicago Flexible Shaft Co.; bids in.
- 250 Tons, Detroit, building for Montgomery Ward & Co.
- 250 Tons, East Lansing, Mich., gymnasium and field house.
- 222 Tons, East Wallace, Idaho, bridges; bids April 21.
- 204 Tons, Frankfort, Ky., State highway project; Ralph Rogers, Bloomington, Ind., general contractor.
- 175 Tons, University City, Mo., sewer; bids in.
- 161 Tons, Eagle, N. M., Rio Grande project (Invitation 8837-A); bids in.
- 160 Tons, Arapahoe and Douglas Counties, Colo., roadwork on State highway 1; bids April 25.
- Unstated tonnage, Alameda, Cal., Navy barracks; bids May 9.
- Unstated tonnage, Mare Island, Cal., paint shop and storage building; bids May 10.
- Unstated tonnage, San Francisco, Alcatraz Island building; bids April 28.

Imports at Philadelphia

PHILADELPHIA—The following iron and steel imports were received here during the past week: 350 tons of ferromanganese from Poland; 2839 tons of chrome ore from Cuba and 1000 tons of chrome ore from Philippine Islands; 149 tons of sponge iron, 52 tons of steel tubes and 5 tons of steel bars from Sweden.